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EDITORIAL.

READERS WILL notice a slight change in the typographical appearance of the JOURNAL this week. The width and length of the columns have been reduced slightly; the object being to increase the margins of the pages, so that copies can be bound or filed without mutilating the text. At the same time the number of text pages has been increased, so that there is no decrease in the quantity of reading matter. We believe the change will be found acceptable.

THE LIMITATIONS of space and the great amount of matter requiring attention in our last issue compelled us to postpone the publication of several interesting reviews. These will be found in the following pages of the present number, and will repay careful reading.

WE ARE INFORMED that at the last meeting of the council of the Institution of Mining & Metallurgy, London, the gold medal and premium of forty guineas offered by the Consoli dated Gold-fields of South Africa, Ltd., for the best paper published by the Institution during the previous year, was awarded by unanimous vote to Mr. Philip Argall, of Denver, for his paper on 'Sampling and Dry-Crushing in Colorado.' At the same meeting the students' prize of ten guineas, offered by Mr. Arthur Claudet, was awarded to Mr. L. H. L. Huddart, Associate of the Royal School of Mines, for a paper on 'The St. David's Gold and Copper Mines.'

THE REPORTED absorption of two prominent Southern iron companies by the United States Steel Corporation is denied by the parties immediately interested. Similar rumors have been circulated before, and it seems probable that there is no more foundation for them now than at an earlier date.

A TABLE GIVEN on another page, shows that the shipments of iron ore from the Lake Superior region, from the time the first mines on the Marquette range were opened, in 1850, up to the end of 1903, reached the enormous total of nearly 248,000,000 tons. Moreover, new developments continue to be made, and even the

older ranges are increasing their output. The Lake Superior country is the backbone of our iron industry—and will continue to be, for more than one generation to come.

BY THE DECISION of the United States Circuit Court at Denver, the suit brought against the executors of W. S. Stratton by Stratton's Independence, Ltd., at the instance of the Venture Corporation, Ltd., which floated the mine in 1899, has been thrown out of court. Judge Riner decided on four counts, any one of which, he said, would have been sufficient to set aside the claim of the plaintiffs. When the matter is finally no longer *sub judice* we shall offer some comment on an episode which has worked injury to many innocent persons besides the original shareholders in the mine. The Independence has produced $10,500,000 since May 1, 1899, and it yielded $4,000,000 before that date; the profits have been $2,500,000 before May 1, 1899, and $4,500,000 since then, and the profits ought to have been greater during both the periods referred to. However, the record is a notable one as it stands.

PROGRESS IN ALASKA.

The review of mining in Alaska by such a geologist and explorer as Mr. Alfred H. Brooks is sure to prove serviceable to the progress of the Far North. We are glad to publish a map with the article, for, after all, a good map is as necessary to an understanding of the description of a wide area as it is to the comprehension of a military campaign; many books and numerous excellent descriptive accounts of new regions are rendered obscure merely through the want of such an aid to understanding. The photograph of a railroad is also added, just to emphasize the fact that this great industrial adjunct is being extended over the tundra and into the wilderness of a region only lately reclaimed to modern exploitation. Such railroads as Alaska has are doing very well, which is indicative of the large amount of exploratory work under way and of the discrimination of the organizers of such enterprises. Already Arctic America is no longer considered a refrigerator, but a home to thousands of the sturdy men and women of our race, and as the actual climatic conditions become known and proper preparations are made to endure them in comfort, there will be a continued increase in the permanent population of the region. Man can mitigate cold more readily than heat. A winter in the snow is better than a summer in the jungle, and we shall be surprised therefore if, even with an equality of mineral resources, the mining regions bordering the Arctic circle do not progress faster than those which lie next to the equatorial line.

A BUREAU OF MINING.

The United States Geological Survey is a complex organization and includes five main branches: Administrative, Publication, Geologic, Topographic and Hydrographic. 'Economic geology of metalliferous ores' and 'Economic geology of non-metalliferous minerals' constitute sections of a division (Geology and Paleontology) belonging to the Geologic branch; statistical work is covered by the division of Mining and Mineral Resources, which also comes under the same main branch.

Forestry appears as a division under the Topographic branch; the Hydrographic includes the three divisions of Hydrology, Hydrography and Reclamation; that is to say, economic geology belongs to a minor department as compared even to the subdivisions of the hydrographic service, and both statistical work and forestry receive more important representation in the distribution of the work done by the Survey. This peculiar state of affairs is due to the exigencies of administration and the gradual growth of the scientific work of the government; it has culminated in a clumsy grouping of different departments and the final subordination of economic geology to such an extent as to cripple one of the very best aids given to the mineral industry of this country. We do not undervalue the help of the science of forestry, or that of hydrography, but to the mining population at large, and to the mining and metallurgical professions in particular, representing $1,500,000,000 in money annually, the present condition of affairs at Washington should be a matter of deep concern. It is not too much to say that the condition of the Survey is illustrated by the encroachment of office space on the part of the wood and water departments until the geologists are crowded two and three in each small room of an unsuitable building, and have neither the space for a drafting table nor the light necessary for microscopic investigations, while there is such a pressure of routine work in the chemical laboratories that the analyses required for geological reports are laid to one side.

The bill creating the Geological Survey was passed on March 3, 1879; Clarence King took the oath of office as chief on May 24. When first organized there were two divisions, general geology and mining geology. King's declared policy was to make economic geology the prominent feature of the Survey work. This policy subsequently was somewhat lost sight of, but has been revived, as far as conditions permitted, under the present administration.

Some of the complexity of departmental arrangements is due merely to exogenous growth, some of it is due to the exigencies of government finance; for instance, there is a division of Alaska, which is co-ordinated with Geology and Hydrography as a separate main branch of the service simply because its expenses are met by a special congressional appropriation. Economic geology is provided for out of the money appropriated for the main division of Geology.

There is only one way to expedite the valuable work of the Survey, and to give adequate systematic attention to the needs of our mining regions, and that is to create a Bureau of Mining as a chief department, with a special appropriation, under the present administration of the Director of the United States Geological Survey. This bureau should include, first and foremost, economic work, especially the investigation of mineral deposits, with proper control over the necessary topographic work and the necessary chemical and microscopic investigations. For purpose of organization there might be three subdivisions, namely (1) coal, cement and clays, (2) other non-metalliferous deposits, and (3) metalliferous deposits. The statistical work should become a co-ordinated branch of the Bureau, ranking with that devoted to economic geology.

We do not consider that technology should find any space in a scheme of this sort. That can be done better by professional men and by other effective agencies already in existence. The Survey has not done much good by its attempts in technology; the chapter on smelting in the Leadville monograph and the article upon the metallurgy of copper in an early bulletin are among the most serious, and at the same time the most futile, efforts in this direction. In technology, in assaying of ores, in sampling of mines, in reporting on the market value of mines and processes, in all these the Survey has no business to advise, nor are its officers best equipped to participate; these matters are done well enough by professional men who are trained specially for such work and earn a livelihood by so doing; it is to the best interests of the country that the Survey direct its energies to work which no individual can carry out alone, and which a complete scientific department is better fitted to perform.

In its early work, say, twenty years ago, the officers of the Survey exhibited all the splendid enthusiasm which characterizes a group of intrepid investigators, and if, during later years, this scientific corps has lost some of the solidarity of pioneer days, it is due largely to that complexity which is unavoidable from mere growth and development. As a body it still includes a large number of scientific men of the very highest caliber, and, we firmly believe, needs only a readjustment of its clumsy organization to have an effective strength such as is ample to cover the necessities of our mining regions. In no other country—we say it advisedly—has economic geology been applied

to the development of industry with such beneficent results as in the United States, and no geological survey has contributed so much to the practical application of the science of geology to mining operations as has the organization in whose behalf we bespeak the earnest interest of our readers. Mining engineers and metallurgists owe much to the work done by the Survey; they can show their appreciation in no way better than by taking an intelligent interest in its welfare, and we ask our readers, therefore, to take up this matter with their representatives in Congress and express their views in our columns in the form of comment and suggestion, such as will aid those in authority in arriving at a basis for a useful Bureau of Mining.

A DIFFERENCE OF OPINION.

Elsewhere in this issue we publish the remarks offered by our contemporary the *North Queensland Register* in criticism of certain views brought forward by our friend Mr. J. H. Curle, together with the rejoinder which he sent to the Australian journal above mentioned. By agreement of the parties to the controversy, they have submitted the matter to us for decision, and we find, upon introspective inquiry, that our hesitation to come between two such doughty disputants is overbalanced by our interest in the subject which elicited the difference of opinion. Mr. D. Green, the editor of the *Register,* quotes us, and thereby would appear to render it only logical that we should agree with him, but the points of controversy are confused by him through the introduction of matters foreign to the question submitted by Mr. Curle, which is, whether the mining men of Queensland can afford "to neglect such things as mine sampling, working out ore-reserves scientifically, and giving distant shareholders full information." To this we would say, that whether in Queensland or anywhere else, those who control mining operations can *not* afford to neglect either systematic sampling, the careful estimation of ore-reserves, or the utmost honesty in submitting information to shareholders. This was, we take it, the main subject of controversy. As regards the importance of the hope of favorable development as a factor in mine investments and the tendency of conservative writers like Mr. Curle to undervalue the speculative element in all progressive mining, we are in agreement with the editor of the *Register.* However, if our desire to prevent the purely investment aspect of the mining business becoming over-emphasized at the expense of the adventurous spirit essential to its growth, should cause anyone to quote us as opposed to the many sound and most useful views brought forward by so well-informed and fearless a writer as Mr. Curle, we should regret it.

We agree with the *Register* that it is not the profit from ore-reserves already blocked out which affords the chief stimulus to mining; but the hope of uncovering new ore. We agree also with our contemporary that some of the reports of large mining companies are no better than those of the local companies at Charters Towers, and with less excuse; but absurdities do not justify each other. In his condemnation of the typical Australian mine report, we are at one with Mr. Curle; these 'reports,' or weekly letters, are characterized, as a rule, by talk of 'good gold,' 'fair stone,' 'rich mundic' and other vague generalities; they exhibit an absolute dependence upon the rough guesses of the managers and a hand-to-mouth policy of mine development. To adverse criticism of such out-of-date haphazard practices we accord unhesitating sympathy. That the managers at Charters Towers, or anywhere else in Queensland, may know "the value of ore by looking at it" is probable enough, but the character of a vein or of several veins in one mine does occasionally change, and all of us who have had underground experience know well enough that looking is not testing. In any event, even if the manager knows the approximate contents of the ore, his description of it as 'good gold' and 'rich stone' conveys very little, unless the personal equation of the man himself is given —in a footnote, as it were—and to shareholders at a distance it is only a delusion and a snare. As to trial crushings versus sampling plus assay, *that* is so old a controversy, and one so thoroughly decided by experience, that it is unworthy of a well-informed mining editor, such as the gentleman of the *Register.* The result of a mill-run is expressed in one figure, and whether the metal extracted comes from one fraction of the shipment or represents its average content, is a point which no mill-test can tell. By sampling you get at the distribution, as well as the average of the ore; and, furthermore, you decrease the chances of error by obtaining not one fact but a great many, whereon to base an estimate. That "a bulk crushing" often does not "live up to the alluring promise of the assays" is true enough, if either be carried out by incompetent persons; but no method is to be gauged by the unskilful use of it, and the experience of earnest professional men in charge of the biggest mines in the world has demonstrated sampling and assay, *plus* judgment, to be the one practicable manner of arriving at the value and tonnage of ore in a mine.

Therefore, we reiterate our decision in this dispute, that in the main question we agree with Mr. Curle. Incidentally he is attacked for an error in appraising one of the mines at Charters Towers. It is a district which we also happen to know by personal observation, and we do not wonder so much that he made one error, as that he was correct in so many instances. A mine valuer has a difficult task; Mr. Curle has committed himself to a great number of valuations, many of which were made so long ago that they have been tested by the relentless testimony of accomplished fact. In the light of this test, he has been found to have made several errors, but they form so small a proportion of the total number of appraisements that we consider his success extraordinary. More such cool-headed and fearless men would perhaps upset several financial apple-carts that we know of, but they must inevitably tend to greater soundness and common sense in mining.

In conclusion, we present our compliments to both disputants, and, not omitting to note the friendly ceremonial suggested in Mr. Curle's last words, we wish we could meet him and Mr. Green at Charters Towers to put into effect a gracious act not uncommon in mining regions; unfortunately, of the three beneficiaries to such a proposal, one is now nearing Port Arthur, another is at Charters Towers, and the third is in New York, so that the best that can be done is to transmit greetings by the wireless telegraphy of the good-will that exists between mining men the world over.

MARKET CONDITIONS.

January 13.

The metal markets show generally a somewhat stronger tone.

Copper is firm, with a considerable business doing for export. Foreign consumers, in fact, seem to be much more anxious to buy than those at home.

Tin shows the usual variations, with very little change in demand manifested.

Lead is quiet and unchanged, demand, however, continuing good.

Spelter remains firm, with a fair demand, considering the season. The Joplin ore market shows a somewhat better range of prices, owing to the slight shortage in supply.

Silver shows little change, Indian demand keeping up current prices.

The iron trade is still quiet, buyers not having recovered from their waiting mood. There is a stronger undercurrent, however.

The western coal markets show better conditions, domestic demand being good, while orders for steam coal improve. Transportation has been slightly interrupted by storms.

The anthracite mines are working actively, after the shutdowns on the holidays. Owing to cold and stormy weather, retail buying is active all over the country, and has begun to affect wholesale trade.

The Atlantic seaboard bituminous trade shows a slight improvement in demand. Snowstorms and cold weather have hampered the movement of coal.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

A CORRECTION.

The Editor:

Sir.—In your issue of December 17 you publish a letter from me on the subject of 'Mesh vs. Aperture' in which certain words are omitted, whether by my own inadvertence or not I cannot say. The specification of copper wire-cloth should read "100 ft. copper wire-cloth 14 in. wide, 14 mesh, No. 21, wire." Please correct and oblige.

HENRY F. COLLINS.

London, Dec. 29, 1903.

MINING COSTS AT CRIPPLE CREEK.

The Editor:

Sir.—Mr. Finlay's interesting communication (in the JOURNAL of November 21) calls attention to an important and much neglected field of discussion. If detailed figures of mining costs were more generally available there would be less misdirected effort in mining. It is often assumed that such figures are of interest only to the mining engineer, to enable him to check his own work against that of others. Their most important value is, however, to the investing public. If such figures were more generally published it would be less easy for an unscrupulous promoter to impose on the inexperienced and there would be a better apportioning of credit to deserving mine managers. Probably all visitors to mining regions have been impressed with the number of idle properties which, on inquiry, are found to be idle because of lack of working capital. It is the old story of costs under-estimated, of a scale of work unsuited to the character or size of the ore-body, and of waste and fruitless effort. The projectors of the various enterprises have usually had utterly erroneous ideas of the cost of the work, and disaster has been the result. Again, it has, unfortunately, happened to many mining engineers that their best efforts were thwarted by lack of appreciation of the significance of figures presented on the part of their own board of directors. In the case cited by Mr. Finlay the fact that low mining costs are not the only desiderata is excellently shown. It is easy on the other hand to call to mind dividends paid by reason of the richness of the ore-body, even despite the absence of any skill in actual management.

It should be the purpose of all interested in the mineral industries to promote the economical and efficient development of our natural resources, and certainly the frank discussion of costs is as essential to this as discussion of methods of work. However desirable it may be to have complete cost records, and I heartily endorse Mr. Finlay's position in the matter, it is not always practicable to do so; and many engineers hesitate to give out incomplete information for fear of its being misleading. This is a real danger properly to be guarded against; but even incomplete figures, carefully stated and analyzed, may carry their lesson without promoting misconceptions.

These considerations shall be my excuse for presenting the following partial figures of the cost of mining 7,087 tons of average Cripple Creek ore. The cost per ton was $14.73, of which $9.06 was for labor and $5.67 supplies and all other costs. In mining the ore 388,725 cu. ft. of stoping was done, equivalent to 54.8 cu. ft. per ton of ore sold. The development work consisted of 1,416 ft. of drifting and 100 ft. of sinking. At the beginning and end of the campaign the ore-reserves were approximately equal, if not somewhat increased. This accordingly represents roughly the amount of development work necessary to keep the mine alive. If this development work be figured in cubic feet, then 56,208 cu. ft. of crude ore and waste must be added to that taken from the stopes; or, for every ton of ore sold 54.8 cu. ft. were stoped and 7.9 cu. ft. removed in development. The work was done with small machine drills, the average of stoping being in the ratio of 120 cu. ft. per machine per shift. This ore was all screened and hand-sorted, so that the 7,087 tons sold was really concentrated from the 34,759 tons broken and handled.

If the costs be figured on the basis of this crude ore instead of the concentrated ore, as is customary in other districts, the cost figures become: labor cost, $1.84; supplies and general, $1.16; total, $3. Of the total cost, approximately $2.60 was mining cost and 40c. was for development. This method of figuring the development cost back to the tons sold is unusual, but has advantages where, as in the present case, it becomes possible. If in a given campaign the ore-reserves were notably depleted or increased, it would be difficult, if not impossible.

Even when the costs are reduced to terms of crude ore and waste broken, Cripple Creek costs are high in comparison with those elsewhere. This is due in part to high labor and in part to the smallness of the ore-bodies, which necessitates the handling of much waste. In the present case the average daily wage was $3.57 for an eight-hour shift, less 20 minutes for lunch and about 10 minutes at changing time. The figures are higher than Mr. Finlay's average, presumably because a larger proportion of machine-men were employed. Coal also averaged higher than in the case cited by him, though timber was about the same. An effort was made to decrease costs by increasing the capacity and it was found that this decreased the item of labor, but not the supplies. The record of two separate months is given below.

Tons sold.	Labor cost.	Supplies and general expenses.	Total.
1,011.....	$11.02	$4.12	$15.14
1,873.....	8.05	4.99	13.04

Not much reliance is to be placed on these figures, however, in view of the small tonnage and the considerable difference in costs resulting from variation in the amount of development work carried on. The particular months given were chosen with a view to eliminating these factors as far as possible. Comparisons made between these figures and the costs at a number of still smaller mines under the same management indicate that the labor cost per ton is not influenced much by the scale of operations up to a monthly output of 1,000 tons. Comparisons with costs at plants having still larger outputs indicate roughly that the cost per ton shipped is influenced more by the character of the ore-body than the scale of operations.

H. FOSTER BAIN.

Washington, D. C., Dec. 18, 1903.

SECONDARY ENRICHMENT.

The Editor:

Sir.—I have read with much interest a letter from one of your correspondents in regard to secondary enrichment of iron pyrite with copper in the Rio Tinto mine; having previously observed the same features in a large deposit of iron pyrite at Cartier, in the Sudbury mining district. There chalcopyrite seems to have been introduced afterward by circulating waters. The copper is found between layers and along the flat faces of the crystals of pyrite, in fact wherever the solutions could find an entrance. In the impervious cores no copper is to be seen. This pyrite is on the western edge of the nickel eruptive basin or syncline. Dr. A. P. Coleman,[1] of Toronto University, who has made an exhaustive study of the nickel mines, says "there are undoubted proofs of the secondary origin from solution" of considerable portions of the (nickel) ore. At Copper Cliff we find bands of quartz or carbonates with ore along the sides of dikes later in age than the main body of the ore, showing that a redistribution of materials by circulating water has taken place, but in general the evidence goes to show that this action has been less important in the production of ore-bodies than the "original segregation from the molten magma."

In the pyrite deposit to which I have referred, there is a width of 12 ft. on the footwall side composed entirely of massive ore, and in it no copper is seen. For the rest of its width, something over 40 ft., the pyrite is in crystals 10 to 150 lb. each, and these again are made up of smaller crystals or layers of ore; in the interstices the copper occurs. To any one specially interested in the phenomenon I could send characteristic specimens of the ore.

EDWARD CLARKE.

Toronto, Ont., Dec. 26, 1903.

NOTES ON MILLING PRACTICE.

The Editor:

Sir.—What follows is suggested by the article of Mr. P. S. Tavener, which appears in your issue of October 24. The questions raised by Mr. Tavener are vital and worthy of the utmost consideration, therefore I take the liberty, through the columns of your JOURNAL, of offering my particular views for what they may be worth, hoping that they may possess some interest to your readers.

Duty per stamp—I think the maximum duty consistent with good amalgamation is naturally the first consideration in the operation of most gold mills; this I try to obtain as follows: First, by using a double discharge mortar (as shown by the accompanying photograph), the rear issue pulp coming on to the apron plate through three openings at the base of the mortar; one opening is visible in the photograph. Second, by maintaining a uniform drop and discharge in accordance with the wear of the die; this I vary in inches, having six strips 1 in. thick, which go under the screen-frame housing, and for each inch in wear of the die one strip is removed; this keeps my discharge uniform, the drop, of course, being regulated by the tappet; to change screens I do not remove housings, the screen-frame being held in place by six thumb-

[1]See 12th Report Bureau of Mines, Ontario, pp. 235-303, 279-280.

screws attached to the housing; in none of this am I troubled with leaks.

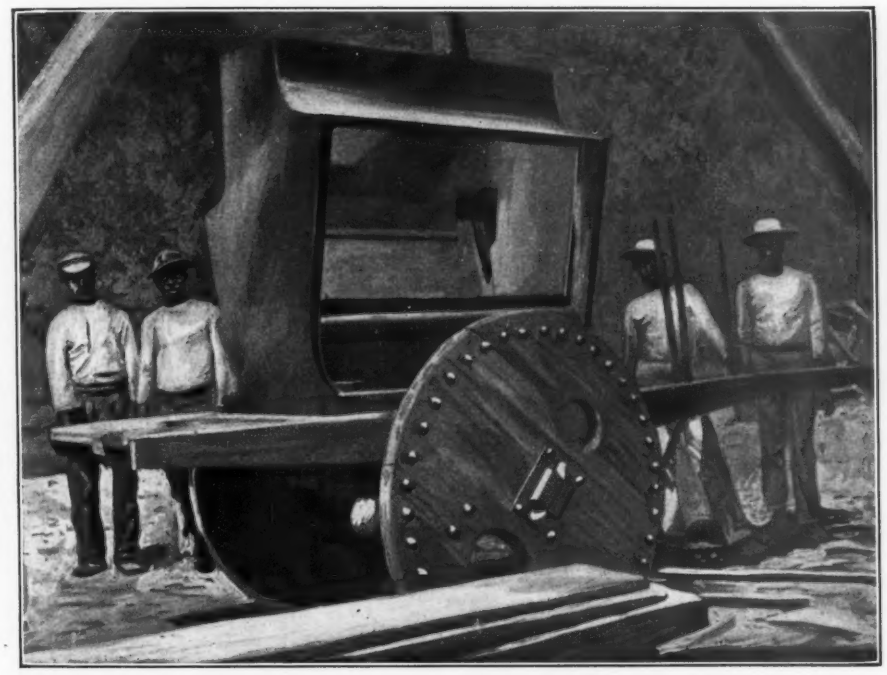
The above are ordinary details; now, to secure the required duty it is necessary, first, to determine the size of the aperture of the screen. To know the mesh is not enough, because the number of the wire of which the screen is made governs the area of the aperture; a No. 30 mesh, therefore, may mean anything. The natural character of the ore governs the size to which it must be crushed; there is no rule to go by; each individual case presents its own conditions, which are governed by more reasons than you would care to publish or I to illustrate. Having determined the size of screen to be used, it is necessary to find the length and number of drops per minute and the height of discharge that will give the best results on a given ore under a given, and previously determined, treatment.

These factors will vary in every mining camp in the world, as nature has fashioned her ores differently in diverse localities; the variations will be due to composition, texture, percentage of sulphides and the like.

Having decided the above factors, it is next necessary to give a grade to the outside plates that will permit the necessary water in the mortars to carry off the sands fine enough for issue; again, the component parts of the ore must govern this grade, much is, and can be, said for, or against, the grade of plates varying from 0.75 in. to 2.2 in. per foot—personally I am a low grade advocate—either way you take it you may give Mr. Tavener quicksilver in the cyanide pulp to be treated, and I think he is right in saying the gold contents of the quicksilver are not appreciably recoverable by cyanide. Some mills do not send their tailings to the cyanide plant: many send them to the creek, where they are a loss to the company that sent them there.

However, it should be noticed that all the above conditions being secured successfully at one mine might not give equal results at another, again due to the natural conditions of the ore to be treated; another question to be considered is the character of labor to be used; this must govern the treatment. The people you see in the photograph are running my mill, and doing it, I think, well. I think a stamp-mill, when treating a given ore, is like any machine, that is, capable of doing its best work only when certain conditions are applied and maintained.

I do not attempt to say or dictate to any one what kind of a mill you or they should erect, back-knee, front-knee, a frame of iron or wood, heavy or light stems, or that you or they should use inside and outside plates, both or none, catch-all boxes or not; in fact none of the ordinary details that can be laid down; conditions must govern all; for instance, my application of power demanded that I erect a front-knee frame, and I did so for no other reason whatever. All the foregoing are matters for consideration due to the particular conditions surrounding a particular property; but I do not say that I think there are not many mills that have been in operation for over one year without a stem breaking, a boss or a shoe coming off, that with an 850-lb. stamp, shoe being new, running 103 to 105 drops per minute, a 6-in. drop, a 7-in. discharge, that have a duty of 5 tons per stamp per diem with a 30-mesh screen, No. 26 wire, and crushing a hard but friable ore.



STAMP-MILL MORTAR ON BRAZILIAN COAST.

As Mr. Tavener says, a half-worn shoe does not give the same duty as a new shoe under the same conditions, and the lowest point of duty is reached in the last week of the life of the shoe. As a remedy I would suggest the following: to maintain the standard duty without using any system of added weights such as false boss or extra tappet, but, as the shoe and die wear I vary the ratio of drop and discharge, giving more drop and less discharge with the light stamp than with the heavy. The wear of the die makes no difference because the screen follows it, but the wear of the shoe decreases the weight of the stamp and therefore its capacity; this I try to obviate by a slightly longer drop and less discharge, and find no difficulty in maintaining the duty. There is, to me, a decided gain in having the screen follow the die, in that it enables me to maintain not only the output but also the uniform size of the sands, a result particularly desirable in subsequent cyanide treatment, as Mr. Tavener so justly points out.

Among the many discussions in your JOURNAL I never see any for or against the use of double-issue mortars; the percentage of these to the total of mortars, in gold-mills, must be very small. In the eighties the Empire Mining Company at Grass Valley increased their mill from 20 to 40 stamps, two of the new mortars being provided with double issue; these ran for a while, and then the rear issue was closed up, as the vanners were found to be overloaded.

At Johannesburg, in 1894, I asked a gentleman connected with the Consolidated Gold Fields Company why double-issue mortars were not more generally used; his reply was, that as others did not use them they did not.

The general aim appears to be to increase duty either by increasing weights of stamps and mortars, or getting greater stability by means of anvil-blocks, concrete, or other classes of mortar-blocks.

It seems to me that the back wash must hold as much pulp in suspension as the front wash and remains in the mortar for want of an exit; if given an issue, why does it not increase the duty?

My mortars were built by the E. P. Allis Company to my own drawings, and present no more difficulties than a single-issue; on the contrary, I find this style very convenient; the front and back mortar bolt-nuts are in full view; the using of suspended ore-feeders makes the rear screen as convenient as any front one; the fact of the front opening being high above the bottom lip makes easy any necessary work inside the mortar.

C. S. RICHARDSON.

Caethe, Minas Geraes, Brazil, Nov. 30, 1903.

ON THE DIFFERENTIATION OF IGNEOUS MAGMAS AND FORMATION OF ORES.

The Editor:

Sir.—Prof. Kemp's letter, published in the issue of November 28, presents this subject in a very lucid and comprehensive manner. I venture to think, however, that certain of his conclusions might be reversed by the introduction of some additional evidence.

In the first place, no analogy can be made between molten metals and molten rock matter, since many mixtures of metals are immiscible; they are no more true solutions than a mixture of ether and water, and are easily segregated in the liquid form. On the other hand, all ordinary liquid silicates mix freely and the fact, mentioned by Prof. Kemp, that their crystallization temperatures are lowered by mixture, shows that they form true solutions.

The cases mentioned as "examples of principles which have not yet found expression" can undoubtedly be laid to either fractional crystallization or immiscibility, or both combined. There is no observed differentiation in purely silicate slags except that resulting from crystallization, and it is evident that convection currents alone destroy all other effects. I think it might therefore be acknowledged, once and for all, that there is no evidence in favor of the differentiation of two liquid components of any silicate rock; this would save

a good deal of repetition. This assumption being granted, it follows that differentiation must proceed while the parent magma is partly solid and partly liquid.

I fail to appreciate Prof. Kemp's objections to Dr. Becker's theory of local fractional crystallization. Why should it not be analogous to the laboratory operation in the case where the magma is wholly fluid and fairly free from solid particles? Normal crystallization depends on the presence of solid matter and makes direct cohesive contact with it, so that the crystals would be attached to the walls; and the main mass of magma, being above the temperature of crystallization of the mineral, would re-dissolve small particles which might become detached. As cooling proceeded, however, the liquid would become more viscous and strewn with little insoluble particles of former crystallizations, and Dr. Becker's theory would not then be applicable.

In regard to my theory Prof. Kemp says: "We cannot conceive of a substance sufficiently plastic to allow its more fluid portions to be squeezed out under pressure and yet sufficiently stiff and resistant to maintain, against this pressure, cavities into which the extract might be squeezed." In this he probably voices what ninety-nine out of a hundred people think; but the idea is nevertheless incorrect and can be disproved by the following simple experiment. Take a large flat dishful of freshly fallen snow not banked down, and add water gently until the snow is just saturated and no more. With a thin knife cut a slightly sinuating fissure or crack, and then, by means of a couple of broad flat pieces of wood stuck into the snow, one on each side of and at right angles to the crack, a shearing strain can be produced along it which will open out the familiar lenticular fracture. If this is done slowly and carefully, more or less water oozes out into the open part of the fissure.

Two other misconceptions of plastoids must be pointed out. Firstly, if the strain be applied slowly enough, the stress necessary to force a viscous liquid from the porous portion is little more than that necessary to force out a limpid liquid. Secondly, the principal stresses come on the liquid and not on the solid portions of the plastoid; in the case of the snow and water, complex pressure due to the head of water was evidently not taken up by the porous mass of snow but by the less compressible water. A liquid will not, however, bear a shearing stress; the burden of this must be taken by the porous mass. Thirdly, absolute cavities need not necessarily be formed in the plastoid. If the fissure is opened slowly enough it will fill with liquid as it is formed and the increment of fluid pressure at the walls will not be appreciable.

Finally, as nearly all the weight of the porous mass is relieved by the buoyancy of the fluid, I do not see why it should not be possible for the fissure-walls to stand as high as any ordinary rock-walls, though the tenacity of the porous mass were only, say, one-tenth that of the solidified rock.

In addition to the gneisses and schists I mentioned previously, I think good evidence of plastoid differentiation is to be found in the diabases of this district, which often contain brecciated diabase zones with feldspathic filling.

BLAMEY STEVENS.

Valdez, Alaska, Dec. 14, 1903.

A DIFFERENCE OF OPINION.

[The editor of the *North Queensland Register*, published in the gold-mining district of Charters Towers, has sent us the subjoined statements of Mr. J. H. Curle and himself, with the request that we give a decision in the matter. We give it in our editorial columns. If any reader cares to discuss the points at issue, he will be welcomed in doing so, for we presume to no finality of opinion. Even the youngest of us is not infallible.—EDITOR.]

Editorial in the North Queensland Register of November 23, 1903.

Since Mr. Curle has quoted the New York ENGINEERING AND MINING JOURNAL, we have much pleasure in publishing an editorial article by that highly-esteemed paper, which deals with Mr. Curle's arguments as to ore-reserves. It will be observed that it points out the fallibility of estimates of reserves, and contends that the prospective value of a property is more often a greater inducement to speculators—Mr. Curle calls them investors—than that portion of the mine which is often mistakenly called 'proved.' As a man who makes his living by it, Mr. Curle naturally takes his vocation seriously; he disregards the element of chance in mining, and considers that unless an expert can write as confidently about ore-reserves as a man reporting on the points of a horse, or on the quality of the land in a hundred-acre paddock, the mine is valueless. We combat that view, and assert that in nine cases out of ten it is the hope of development, and not the profit from reserves (which is frequently illusory), that induces speculation. To judge from his letter, one would think Mr. Curle could not make a mistake, and yet that portion of his book dealing with Charters Towers dismissed the Queen Cross Reef in a few lines as a valueless mine with no future. Why did he form such a poor opinion of that property? Was it because it had no "reserves"? Fortunately the shareholders had a better estimate of the mine which, since Mr. Curle's prophetic utterance, has turned out 110,000 oz. of gold, paid £269,000 in dividends, and has still a market value of, say, £630,000. Mr. Curle himself fell into the same error to which the New York ENGINEERING AND MINING JOURNAL refers. He preferred a partially worked-out mine like the Brilliant & St. George United to the Brilliant Central, which, just at his visit, had cut the Brilliant reef, and was then, comparatively speaking, without reserve. . . . Mr. Curle, in comparing our company reports with those issued by mines employing literary mining experts, says: "Compare the last yearly reports of Brilliant and St. George or Day Dawn Block and Wyndham with similar reports, say, of Ivanhoe, Crown Reef or Nundydroog." Let us add, or compare the 'George' and 'Block' reports with those of the Lake View Consols, Briseis or Great Central Freeholds; the last named three cradled in the purple hue which surrounds experts of the most profound knowledge and world-wide experience. Mr. Curle, in his article from which we originally quoted, refers with contempt to the contention of Charters Towers managers that "they knew the value of the ore by looking at it." In our opinion, any manager who has handled a Charters Towers mine and does not know where his rich and poor faces are is the "empiricist" which Mr. Curle calls him for making the claim. We speak of what we know. Look at the regularity of the Brilliant crushings for over 14 years. . . . There are other mines here whose crushings are steadily maintained, from a variety of faces, where the result is kept even without that prodigious energy in sampling which Mr. Curle so fervently eulogizes. Our correspondent pooh-poohs the idea of "knowing the quality of ore by looking at it." We contend that local experience quickly gives that faculty, and in proof of it we can assure Mr. Curle that if 2 ft. of black mineral stone, of the same appearance as that worked in the early section of the level, came in the end of No. 8 east at the Victoria and Queen, that before a single assay was taken shares would jump to £1, and £65,000 be added to the market value of the mine. That is pretty conclusive evidence, we think, that not only mine managers, but ordinary mining speculators, are prepared to invest heavily on their estimate of the stone's "looks." . . . We only write of Charters Towers, of which we can speak from experience; and having regard to the irregularity in size and ever varying quality, we have no hesitation in saying that reports based on assays and measurements would be more likely to mislead the speculative public than to assist them. . . . The observant manager who watches his faces, notes the proportion of ore milled from each level, and then compares the result with previous crushings, will be much nearer the mark than the mere sampler. The former will be making deductions from ascertained results; only mining men know how seldom a bulk-crushing lives up to the alluring promise of the assays. A trial-crushing from a winze, level or stope is infinitely preferable to most exhaustive samplings—an assay is only an indicator; a trial-crushing the result commercially ascertained. The Melbourne *Argus* was attracted by Mr. Curle's contentions as to the sampling of lode mines for reporting purposes, but we have never observed in the columns of that famous journal that any Victorian Company has considered the suggestion worthy of adoption. Under other conditions than those obtaining here, Mr. Curle's contentions would doubtless apply; nor do we disregard the value of assays at any time, but sad experience has shown us, and many others, that they are a magnificent engine to mislead. Mr. Curle should himself be forgiving. Even he has made bad blunders, and yet he almost claims infallibility. Take our own field. He was widely optimistic about the Brilliant and St. George United, missed the Brilliant Central when all her profits were before her, though thoroughly grounded in the mine, and worst stroke of all, contemptuously dismissed in three lines as worthless a mine which was worth a million—the Queen-Cross. And yet he styles our managers "empiricists," and laments the lack of literary copiousness in our company reports.

After all it is not on what appears, but what may develop, that the miner and the mining speculator operate. As the New York ENGINEERING AND MINING JOURNAL says: "We venture to doubt whether 10 per cent investments on a basis of ore-reserves will ever be a leading feature of gold mining activity; rather, it is the 20 to 25 per cent return with the chances of a speculative enhancement which engages the mine operators who are most successful. After all, the best kind of mining is that actuated by the combined skill and spirit exhibited by the Cornish 'tributer' or more modern lessee, or 'leaser,' who sizes

up a certain portion of territory in a mine and takes the risk of its development, not on ore to be seen in plain view, but on the reasonable expectation of finding something good. It is the experienced 'tributer's' sense and not the money-lender's caution which has built up mining in the past, and will make it a great industry in the future."

Mr. Curle's Reply.

To the Editor of the *North Queensland Register:*

Sir.—In the *Australasian* of September 12, I read an excerpt from an article in your paper referring to myself. This article, I believe, was in reply to a criticism of Queensland mining methods which I had written in the *Economist.* It will make the point clearer if I repeat that my criticism, while praising the value of your mines, was unfavorable as regards the lack of systematic sampling in these mines and the haphazard methods Queenslanders employ in their estimation of ore-reserves. I specially instanced the case of the Brilliant and St. George, and the sudden and unannounced falling off for which shareholders would have been prepared had the ground all been properly sampled when it was opened up. It is at this point that you took rather violent exception to what I had written; indeed, you appeared to think that my criticism was unfair, and you hint that because the mine had disappointed me I was trying to "wreak my annoyance" on the mine management. But may I point out to you in cold blood that you are mistaken about this? If I did this sort of thing, I should long ago have become a discredited person. I criticise a mine or a method because I believe the mine to be bad, or the method wrong, and because, with a very wide experience of mines, I believe that my remarks may do some good. But I have never used hidden weapons in this; I "play the game." Needless to say, I have no annoyance against the Brilliant and St. George, and, as the manager had the civility to show me twice over the mine, I certainly have no bias against him. But all the same I blame the system as much as ever, and shall continue to do so. I say that, in the case of the St. George, shareholders should have had ample warning of the big falling off that was so suddenly to happen. This they could have had if all its ore had been properly sampled at the time it was opened, and if, on these data, the value and quality of the ore blocked out had been reported to shareholders in the usual way. It is, of course, open to the mine owners of Charters Towers to reply to this, "You mind your own business, and let us manage our own mines as we see fit." But then I will also point out that your capitalists have always been glad to sell their shares to London at highest prices, that English capital has consequently a big interest in your mines to-day, and that I, as a spokesman for this English capital, have every right to put our side of the question. The Charters Towers miner poohpoohs the idea of systematic sampling. He prides himself on his skill at diagnosing the value of the ore by looking at it. That is well and good—for those who can go down the mine every week, and keep in close touch with their investment. But what about us, who live 12,000 miles away, who have collectively a large interest in the mines, and who are inclined to kick at the farcical little documents which your mines issue yearly or half-yearly, and which are called 'reports'? It would be no degradation on your part to fall in with the views of a critic like myself, and decide in future that your mines should be properly sampled, and that your ore-reserves should be carefully estimated for your yearly, half-yearly, or monthly reports. I'm aware that the Australian mining man looks on the English investor as a "bit of a mug," in other words, rather a fool, but you may take it from me that they are not all fools in England; that there are people there who would value such reforms very much indeed, and that in the long run your colony or your particular gold-field would not suffer financially from such a course. Further, let me point out that all the great gold mines of the world today furnish their shareholders with the most complete details of assays and ore-reserves, that their directors would never dare to take the least retrograde step in this direction, and that there is an increasingly large public which insists on such particulars. It is a guarantee, too, of good work, for the manager has got to produce the results his assays show or make way for an exacter man. Just let me tell you a little story on that head. Three years ago I went to report on the Raub mine, in Malay Peninsula, well known by repute to your readers. I found that although worked for 11 years it had never once been sampled. The late manager had for years reported to the shareholders that his ore-reserves were 300,000 tons of ore, worth about 1 oz., and the company was then valued at £750,000. As the result of my sampling, I found that the 300,000 tons was actually 39,000 tons of the low value of 9 dwt; the rest was unpayable. As a matter of fact, the mine was almost valueless, and has done little good since then. The shareholders sustained an appalling loss. That was the work of a man who despised sampling. His false estimate was the cause of a good mine manager (Mr. Waters, who, I believe, is now in charge of the Queen Cross mine) going to Raub, and making unavailing efforts to produce the results shareholders were led to expect. Now, Mr. Editor, if you think I am a very foolish person in telling all your Queensland mining men that they can't afford to neglect such things as mine sampling, working out ore-reserves scientifically, and giving distant shareholders full information, for there is evolution in the mining world as elsewhere, and what was once right may be now out of date, suppose that you refrain from slanging me, and decide to refer the matter to arbitration. Let us submit the whole question to the ENGINEERING AND MINING JOURNAL of New York, which is the leading mining publication in the world to-day, and whose editor is an authority who carries great weight. Will you oblige me by writing an article on this matter from your point of view, and by printing this letter, side by side? Then cut out the two and submit them to New York, and next time I visit Charters Towers the winner will have to stand drinks. Yours, etc.,

J. H. CURLE.

The compression of air to 100 lb. at one operation in a cylinder, results in a high temperature; and for this reason air-compressor cylinders are enclosed in water-jackets. When the temperature exceeds 400° F., it is difficult to lubricate the cylinders. The compression of air in two stages, by compounding in two cylinders, secures a higher pressure with greatly decreased temperature.

THE GEOLOGICAL SOCIETY OF AMERICA.

BY E. O. HOVEY.

The sixteenth annual meeting of the Geological Society of America was held at St. Louis, December 30, 1903, to January 1, 1904, in conjunction with the fifty-third annual convention of the American Association for the Advancement of Science. The president for the year just closed was Mr. S. F. Emmons, of the United States Geological Survey. His presidential address was delivered at the close of the annual dinner at the Planters' Hotel, December 31. His subject was 'Theories of Ore Deposition, Historically Considered,' and the address will be published in full in forthcoming issues of the ENGINEERING AND MINING JOURNAL. The programme, as presented, comprised thirty-eight papers, scattered through the following subdivisions of geologic science: Areal, paleontological, petrographical, physiographical, historical, physical and structural, glacial and stratigraphical. Twenty-eight of these papers were read in full or in abstract, but this report will concern only those which seem likely to be of interest to mining men.

The Sudbury nickel-bearing eruptive was discussed by Professor A. P. Coleman, of Toronto University, who said, in part, "Fieldwork carried on during two summers for the Bureau of Mines of Ontario has proved that the eruptive rock accompanied by nickel ores in the Sudbury district has a continuous outcrop inclosing an oval area 40 miles by 16 miles in extent. The rock dips inward on all sides, sometimes at an angle of 45 degrees, and it is estimated that the cubic content of the basin is nearly 1,000 cubic miles. The boat-shaped sheet of rock is from one to three miles thick, and has an igneous contact with the rocks both above and below. The sheet of eruptive material was pushed in between the sedimentaries and formed a laccolith. The overlying beds, therefore, are older than the ore-bearing rock, instead of younger, as was formerly supposed. The outer, lower edge of the sheet consists of norite, and is much more basic than the inner, upper edge, which is a micropegmatite, consisting mainly of alkaline feldspar and quartz. The nickel ore-bodies are found arranged along the basic, outer edge or on irregular dike-like extensions of the norite, which may reach six miles from the main body of the eruptive. Most of the ores, which are pyrrhotite and pyrite containing nickel and platinum, seem to have settled by gravitation to the bottom portion of the still molten eruptive, but a part is of later origin, through the action of circulating waters. One-half of the world's supply of nickel is now derived from the few mines at work, and scarcely a beginning has been made upon the exploitation of the ore surely in the rock. The sulphides form a very appreciable portion of the basic portion of the eruptive, and they are the best example known of an eruptive ore."

In the course of a paper concerning the geological phenomena observed on a journey from Durango, Mexico, westward to Ventanas, across the plateau of the Western Sierra Madre, Mr. O. C. Farrington, of the Field Columbian Museum, described at some length the Cerro Mercado, or 'Iron Mountain,' and discussed its origin.

Concerning the widespread occurrence of fayalite in certain igneous rocks of Wisconsin, Mr. Samuel Weidman, of the State University of Wisconsin, brought out the fact that in the central part of Wisconsin, within the area of

pre-Cambrian rocks, there is a large variety and abundance of igneous rocks, which intrude in a much older sedimentary series, and the whole lies beneath a later sedimentary series. These igneous rocks may be divided into three series, the oldest being rhyolite, the next diorite gabbro and peridotite, the latest, granite, quartz-syenite, nepheline, sodalite, and ægirite-syenites, and related rocks. In the last-mentioned series the fayalite occurs as a persistent though minor constituent. The alteration of this mineral is to magnetic iron oxide, and it is thought that the occurrence may throw some light upon the origin of some iron ores.

Professor U. S. Grant, of Northwestern University, presented a paper, upon recent field-work in the Wisconsin lead and zinc district, in which he said in part: During the summer of 1903 the Wisconsin Geological and Natural History Survey did some detailed mapping of selected areas in the southwestern portion of the State, which is part of the Upper Mississippi Valley lead and zinc district. In this field-work the topographic and geologic mapping were carried on, *pari passu*, by the same individuals; the field sheets prepared were on the scale of 8 in. to 1 mile, with 10-ft. contour interval, and in publication the scale is to be reduced one-half. While maps of this scale and detail will be valuable in themselves, it is hoped that they will give important results in working out the details of the relations of the ore-bodies to the structure of the district.

Professor A. R. Crook, of Northwestern University, described the occurrence of molybdenite at Crown Point, in the middle of the State of Washington. The locality is of interest, because it furnishes the largest amount of the ore obtained from any locality in the country. Twelve tons were produced here in 1902. The mine is in the face of a cliff 900 ft. above the mining camp. The molybdenite occurs in a nearly horizontal vein from two to three ft. thick. Levels 190 and 80 ft. in length have been driven, and 110 ft. of working opened. The vein material is a compact, granular, white quartz, through which the mineral is disseminated. Less is found along the edges than along the middle of the vein. Four analyses failed to find any molybdenum in the country rock, which is an altered granite, hence the ore seems not to be a lateral secretion. The crystals of molybdenite are well developed, and have been formed at the expense of the granite. Nearly all consist of the pyramidal planes.

Mr. E. R. Buckley, State Geologist of Missouri, described the system employed by the Missouri Geological Survey in keeping its records. He said in part: Two classes of inquiries are received by a State geological survey: (1) The mineral resources of a particular section of land, and (2) The occurrence of a certain resource in a particular county. To answer these inquiries requires the collection and storing of a vast amount of information. The collecting of this information is gradually carried on by the usual field-work of the survey and correspondence. The storing of this information in such a manner as to make it easily accessible is brought about by an adaption of the card catalogue system. A location and a subject case are provided in which all data relating to the mineral resources of the State are recorded.

The Society was welcomed to St. Louis by Mr. J. A. Holmes, Chief of the Department of Mines and Metallurgy of the Universal Exposition, to be held this year in the city. The reports of the council and the officers of the Society showed its satisfactory condition. There are now 254 fellows on the active list, aside from the eleven new names added by election at the St. Louis meeting. During 1903 the fourteenth volume of the bulletin of the Society was issued. It is a book of about 600 pages, comprising valuable articles in the several branches of geology. The illustrations consist of 65 half-tone plates and 43 line drawings, making the volume one of the most attractive ever issued by the Society. Three fellows have died during the past year: J. P. Lesley, for many years State Geologist of Pennsylvania; W. C. Knight, of the State University of Wyoming, and Peter Neff. Memorials of these were presented by Messrs. J. J. Stevenson, E. H. Barbour and H. P. Cushing.

At the same time with the meeting in St. Louis, the Cordilleran section of the Society met at the University of California, Berkeley, and listened to a programme comprising seven papers.

THE PRODUCTION OF THE MINOR MINERALS IN 1903.

By JOSEPH STRUTHERS.

ARSENIC.

The production of arsenious oxide (white arsenic) in the United States during 1903 was 590 short tons, as compared with 1,353 short tons in 1902 and 300 short tons in 1901, the last-named year being the date of the inception of the industry in the United States. The sole producer of white arsenic is the Puget Sound Reduction Company, at Everett, Wash., which has recently passed into the control of the American Smelting & Refining Company. Prior to 1899 the world's supply of arsenic and its compounds was derived mainly from the mines in Cornwall and Devon, England, and near Freiberg, Germany. The closing down of the Devon Great Consols mine in 1901 led to the exploitation of deposits in other countries, Canada becoming a new producer in 1900 and the United States in 1901.

Although arsenical pyrite (mispickel, $FeS_2 + FeAs_2$) occurs in many places in Ontario, Canada, the total output of arsenic has been derived from the mines of the Canadian Gold Fields, Ltd., at Deloro, Hastings county, the production of which continued to increase until April, 1903, when the mines were closed down pending negotiations, with the view of consolidating the arsenic properties at and near Deloro into a single company in order to produce a largely increased annual output at a lesser cost per ton.

A description of the process of manufacture used at Deloro in connection with the extraction of gold from the ore is given in 'The Mineral Industry,' Vol. XI.

The United States Arsenic Mines Company, capitalized at $500,000, with Pittsburg backing, has been developing an arsenic deposit at Pilot Mountain, 17 miles from Christiansburg, Va. An adit 215 ft. has been driven into the hillside, and from it a drift of 55 ft. extends to an 8-ft. vein of arsenic ore reported to average 25 per cent arsenic content which can be mined at a cost of 70c. per ton. A building 300 by 70 ft. has been erected for the mills and furnaces, and a colony of dwelling-houses for the laborers, a store, blacksmith shop, saw-mill, office, laboratory, etc., have been put up. The plant is equipped with a 125-h. p. Westinghouse engine, two 75-h. p. return tubular boilers, four dynamos (one of 75 h. p., one of 15 h. p. and two of 2 h. p.), a 10 by 20-in. Blake crusher, a 27-ft. Howell-White calcining furnace, a set of rolls for pulverizing the product, pumps, etc. The capacity of the plant, when finished, will be 70 tons of refined arsenic per day. The region is wild and mountainous, and a traction engine was used to transport the machinery from Christiansburg. The company expects to begin producing white arsenic early in 1904.

The Mineral Creek Mining Company, owning an arsenic property at Mineral Creek, Wash., reports an immense body of regular ore which can be mined and converted into white arsenic very cheaply. About 1,000 tons of ore have been mined and are held in stock awaiting the completion of the smelter, which is nearly ready for operation. Mineral Creek is situated not far from Elba, which is on the line surveyed for the Tacoma Eastern Railroad.

A recent discovery of metallic arsenic has been made at Washington Camp, Santa Cruz county, Arizona. The metal occurs in masses attached to the walls of small pockets in a dolomitic limestone, and in some instances the pieces of arsenic weighed several pounds each. From one pocket more than 50 lb. of metallic arsenic were obtained.

THE PETROLEUM FIELD OF SAKHALIN.—A Russian expedition which was sent out to explore the petroleum deposits of Sakhalin, an island off the east coast of Siberia, has recently returned and reports that the field is a very promising one. (*Chemische Industrie*, December 15, 1903.) The oil-bearing strata are found along the northern half of the eastern coast in the vicinity of Nutowo and Boatassin. A well was sunk near the latter locality in 1901 and has since flowed without interruption. There are several petroleum lakes around Nutowo which are fed by natural springs. The oil is especially suited for fuel purposes.

TOPOGRAPHY OF THE MANNIE QUADRANGLE.—A study of the Mannie (Tennessee) quadrangle, which was topographically surveyed during the summer of 1903 by the members of the United States Geological Survey, developed two interesting facts of economic importance. They are the general occurrence of iron-ore throughout the quadrangle and the unfortunate destruction, now taking place, of its native forests of oak and poplar.

The quadrangle lies mainly within the western iron region of Tennessee. Mining on a large scale is carried on at Mannie, in the northeastern portion of the quadrangle. The ore is a red hematite, found in pockets from 10 to 60 ft. thick. It is easily mined from the surface and reduces to about 35 per cent metallic iron. A blast-furnace having a daily output of 250 tons of pig iron has been in operation here for a number of years. It was formerly a charcoal furnace, but the fuel now employed is coke, which is shipped from mines on the Cumberland plateau. Limestone abounds here and is quarried near the furnace.

THE MINING INDUSTRY IN ALASKA.*

By ALFRED H. BROOKS.

Introduction.—The value of the gold output of Alaska for 1902 was $8,345,800, nearly $200,000 more than that of the preceding year. The figures for 1903, as estimated by the Director of the Mint, were $6,921,157, showing a decrease. Of this output the placer gold forms about seven-eighths, and is increasing much faster than the yield from lode mining.

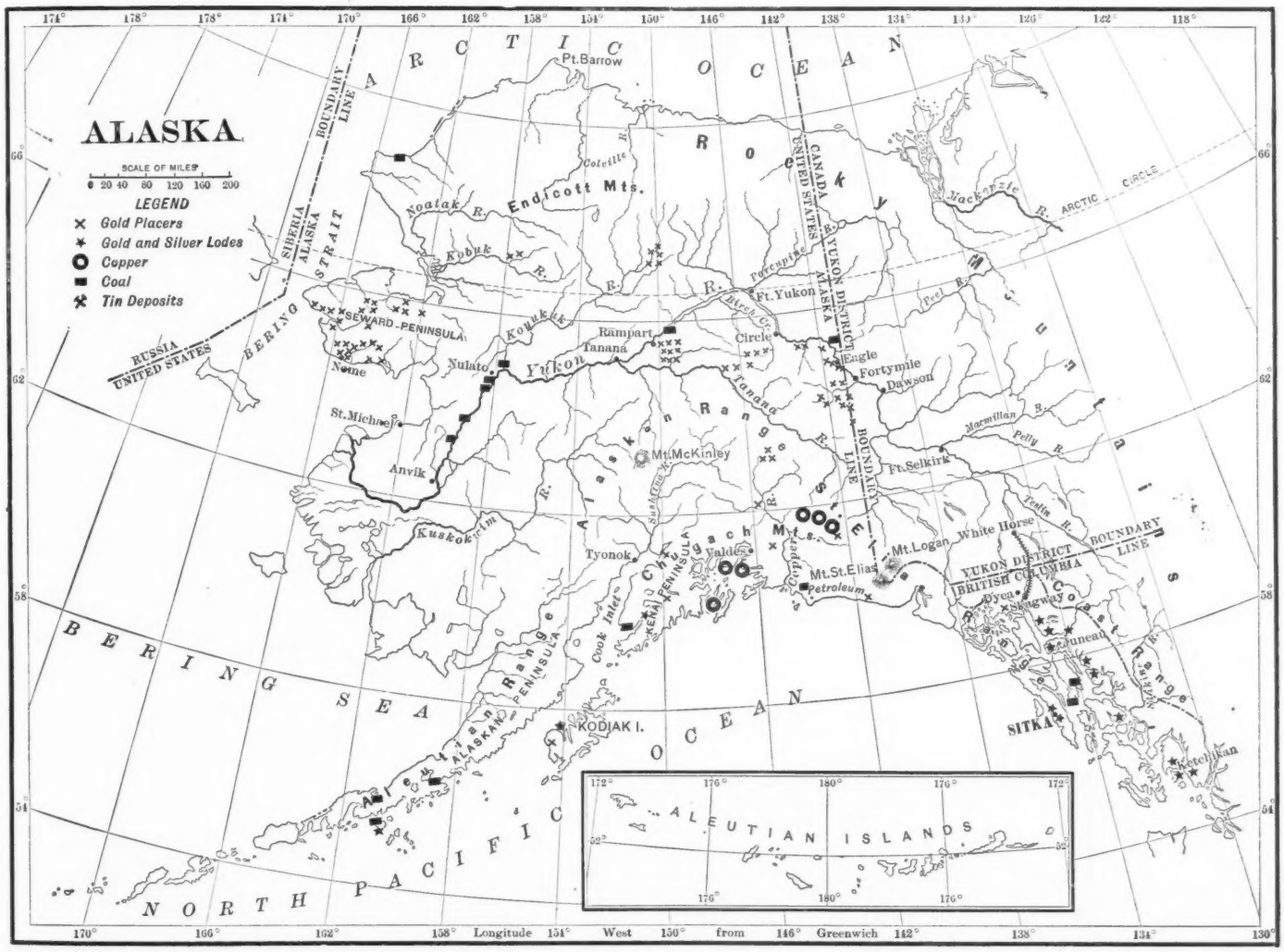
The other mineral products of Alaska are as yet of small importance, silver ranking first, with an annual output of $60,000 to $100,000 in coining value. A few thousand dollars' worth of copper is produced, but only incidental to prospecting and development, few of the copper mines having as yet installed their mining equipment. It is not generally known that Alaska contains some excellent coal; but this is only mined for local consumption, and the entire output does not exceed 4,000 to 5,000 tons per annum. The year 1903 witnessed the exportation from Alaska of a little stream tin and a small quantity of petroleum. The stone industry is represented by one marble quarry near the north end of Prince of Wales island, which, as far as known, has not yet shipped any building stone.

During the past year the ever active prospector has extended the knowledge of the distribution of placer gold by the discovery of the Fairbanks district on the Tanana, the Good Hope district in the northwestern part of the Seward Peninsula (both of which give promise of important commercial development), and the Kobuk district (of which less is known) in the upper basin of the river of the same name. Of far greater importance, though they have received less notice in periodic literature, are the new discoveries and steady developments made in the older districts, for it is to these that the larger part of the mineral output is due. The introduction of mining machinery and improved methods has been general throughout Alaska wherever transportation facilities exist.

Southeastern Alaska.—The pan-handle, or southeastern Alaska, as it is called, so far promises the most important lode mining. An even climate, accessibility, timber, and ample water power make this region particularly favorable to economic operations. The public has been slow to appreciate this fact, for unless undeceived by personal experience it still regards Alaska as the land of ice and snow, of the Esquimaux and fur-trader.

Juneau Region.—Juneau is still the focal point of the productive mines in this region, though other towns promise vigorous competition. Before the discovery of the Klondike this field was rapidly developing, but it received a decided check when the first tidal wave of popular excitement carried the mining men into the interior, and later to Nome. Now Juneau is recovering its former position of importance. Many properties, including some of the largest, have changed hands during 1903, and a score or more of competent engineers and mining experts have been in the field making examinations and estimates. While no new mining plants have actually been installed, plans have been formulated for large investment of this character. Able men, backed by ample capital, are at the head of these enterprises, which carry no element of 'boom' and are mostly planned after careful and exhaustive study. As this article goes to press it is reported that the Alaska Treadwell Gold Mining Company has begun work on a two-mile tunnel, which is to start at 600 ft. above tidewater near Juneau and tap the Silver Bow basin, where the company controls extensive property; and that the Perseverance Mining Company, which also holds important interests in the basin, is planning to attain the same end by a trolley line to tidewater. It is the intention of both companies to place their mills near tidewater, so as to avoid the snow-slides which interfere with work in the basin during some of the winter months.

In the ceaseless roar of the great mills of the Treadwell, the mining public sometimes loses sight of the fact that this does not cover all of southeastern Alaska. While it is by all odds still the great enterprise of this region, several others are producing and many more give promise of doing so. In the mainland belt, extending from Endicott Arm northwestward along the coast and including Sum Dum, Snettisham, Juneau, Salmon creek, Eagle river,



MAP SHOWING DISTRIBUTION OF ORE-DEPOSITS IN ALASKA.

*Published by permission of the Director of the United States Geological Survey.

Berner's bay and Seward, many prospects are being developed and a number of important producing mines are being worked. Placer mines are being exploited at half-a-dozen localities. In the islands to the westward mining operations are going on at Rodman bay, where a large plant is being installed, and Silver bay, where less important developments are in hand.

Porcupine District.—It would be impossible to enumerate all of the localities in this region where the miner and prospector have been active. Attention should be called, however, to the Porcupine placer district, which lies in the Klehini and Salmon river valleys, both tributary to the Chilkat and 15 to 20 miles distant from tidewater. The development of this district has been retarded by the boundary dispute, for the provisional line of the *modus vivendi* of 1899 ran almost through its middle. The deposits of Porcupine creek are of such character that they require the investment of large capital for their exploitation. On the creek itself there seems to be room for a strong company. In spite of the serious drawbacks to its exploitation, the district has gone on developing and producing ever since its discovery in 1898.

Ketchikan District.—The formations of southeastern Alaska trend northwest-southeast, parallel to the coast line, preserving a more or less persistent lithologic character; and as certain of these formations have proved to carry bodies of ore, other mineral deposits, as would be expected, have been found throughout the belt. The Ketchikan district, lying adjacent to Dixon Entrance on the south and including portions of the mainland as well as Prince of Wales, Gravina, Revillagigedo and a number of smaller islands, is second only to the Juneau region in importance. Conditions have changed materially during the past three years, in which more rational and systematic methods of prospecting and exploitation have been introduced. At present there are several gold and copper properties which are being worked at a profit, though still in a small way; and investigations looking toward the establishment of large mining plants are going on in a score of places. In some of these the installation of machinery is now under way, while in others the work is still being directed toward determining the extent of the ore-bodies.

The copper ores are prevailingly chalcopyrite and bornite, and another class of deposits, which have been found in a few localities, show large exposures of bornite and azurite at the surface. All of these ores usually carry gold. The gold-bearing lodes thus far successfully worked have been small though persistent quartz veins, carrying high values in free gold. Larger deposits of free gold are not absent, however, but none have been successfully exploited. This does not mean that such undertakings will not meet with commercial success, for the attempts that have been made were ill-advised, reaping the failure which is apt to result from building a mill before the approximate extent of the ore-bodies has been proved. The natural advantages of the Ketchikan district will probably make it possible to exploit lower grade ore-bodies than can be worked with profit in most parts of the world.

On the west side of Prince of Wales island operations are being pushed at several localities on copper properties which it can be conservatively said show excellent surface indications, though they have not been tested to any considerable depth. The Alaska Copper Company, on Copper Harbor, in order to reach an ore-body which outcrops in extensive ledges of copper carbonate at the crest line, 3,000 ft. above tidewater, is driving an adit which is expected to cut the ore-body 1,500 ft. below the surface workings. A smelter is also under construction.

At the Mamie mine on the Kasaan peninsula, in the eastern part of Prince of Wales island, a large body of chalcopyrite ore is reported to be opened up to a depth of 100 ft. or more. A smelter is in course of erection by the same company that is opening the mine. The Mt. Andrew, an adjacent property where considerable development work has been done, is unfortunately tied up by a lawsuit.

Other developments too numerous to mention are going on throughout the Ketchikan district. It should be noted that several small stamp-mills are being built. A second ore-bearing zone has been found east of the great belt of coast range granite, which was long believed to mark the eastern line of possible commercial importance, and gold lodes with accompanying placers have been found on the Unuk river, which flows into Behm canal, and on Salmon river, which empties into Portland canal. Some of these prospects lie close to the newly determined boundary line, the early location of which is essential to their development.

Central and Southwestern Alaska.—West of Cross sound the Pacific coastal belt holds little of interest to the placer miner. Some gold has been found in the beach placers of Lituya and Yakutat bays, which have been and are being exploited spasmodically in a small way. More important is the alleged discovery of placers in the valley of the Yakataga river, but the reports as to their extent and value as yet lack confirmation.

Prince William Sound.—This deep indentation of the coast line west of the Copper river delta has long been known as a region of chalcopyrite deposits. These have been located and some small developments made, but in few cases has the work gone to sufficient depth to prove their extent. These lodes, like those of southeastern Alaska, are favorably situated with reference to water transportation, and the region yields some timber; but the climate is much colder than that of the southern districts. At the Gladhaugh mine a small plant has been established and work has been going on for the past few years. During 1903 the region has been subjected to an examination by a number of competent mining experts, and more extensive development is expected.

Copper River Region.—The Chistochina placer district continues to be worked, but the distribution of gold-bearing gravels is not sufficiently wide to promise a material increase in the present output, of $200,000 to $300,000 per year. The fact that it is 200 miles distant by trail from tidewater materially increases operating expenses. There are rumors of important discoveries lying to the west of the Chistochina basin, probably on streams draining into the Sushitna. It seems quite possible that the conditions which gave rise to the Chistochina placers may recur at other localities in the region and that its full resources have not yet been proved.

The placers of the Niszena river, tributary to the Chittena, an eastern fork of the Copper, are frequently mentioned in periodic literature, but are not known to be actually productive.

The copper deposits of the Copper river are receiving some attention from mining men, though there seems to have been but little attempt at a systematic investigation of individual lodes. The surface indications are such as to warrant an expenditure of money in exploration. The ores, chiefly chalcopyrite and bornite, with some native copper, occur in a well-defined zone near the contact of white limestone and greenstone which follows the southern slope of the Wrangle mountains, about 200 miles distant by trail from tidewater. For the purpose of exploiting these deposits a railway will have to be constructed across the Chugach mountains at an altitude of about 2,800 ft. On the north side of the Wrangle mountains, in the drainage basins of the Tanana and White rivers, is a second belt of copper-bearing rocks which has been but little prospected.

Cook Inlet Placer Fields.—Gravels carrying gold in paying quantity have long been known on some of the streams which are tributary to the upper end of Cook Inlet. This district, known as the Turnagain Arm or Sunrise district, has shown a steady development during the past three years; its accessibility, long open season and abundance of timber making it possible to exploit placers of relatively low grade. Efforts during the past year have been directed toward erecting hydraulic plants, several of which are now at work.

On the Kenai peninsula, south of the above district, a hydraulic equipment has been installed at Tustumena lake to work a large body of low-grade gravel. Another company has erected a thirty-stamp mill to work a free-gold quartz ledge near Aurora, on Kachemak bay, an eastern arm of Cook Inlet.

Seward Peninsula.—At least six-sevenths of all the placer gold of Alaska comes from the Seward Peninsula, whose output of $5,000,000 or $6,000,000, it is safe to say, has far from reached its maximum. The total tonnage of vessels to the Seward Peninsula during the season of 1903 aggregated 96,822. While some of the older creeks of this region have been nearly stripped, placer mining in the peninsula, as a whole, is but fairly begun. The introduction of better methods has entirely changed the character of operations. Placers which under the old conditions could not be touched, can now with the aid of hydraulic methods, steam hoists and shovels, etc., be made to yield a handsome profit. While it is improbable that any creek gravels yielding less than $2 or $3 per cu. yd. have been mined at a profit, there is no doubt that ground of a much lower grade will prove profitable in the near future.

The placer gold of the Seward peninsula is remarkable for wide distribution and variety of occurrence. Beside the creek and gulch gravels, which with the beach deposits have thus far produced most of the gold, there are the bench placers, the high benches, the old beaches and the gravel plain placers. The last mentioned have only recently received attention and there is no reason to believe that the limit of discoveries has been reached.

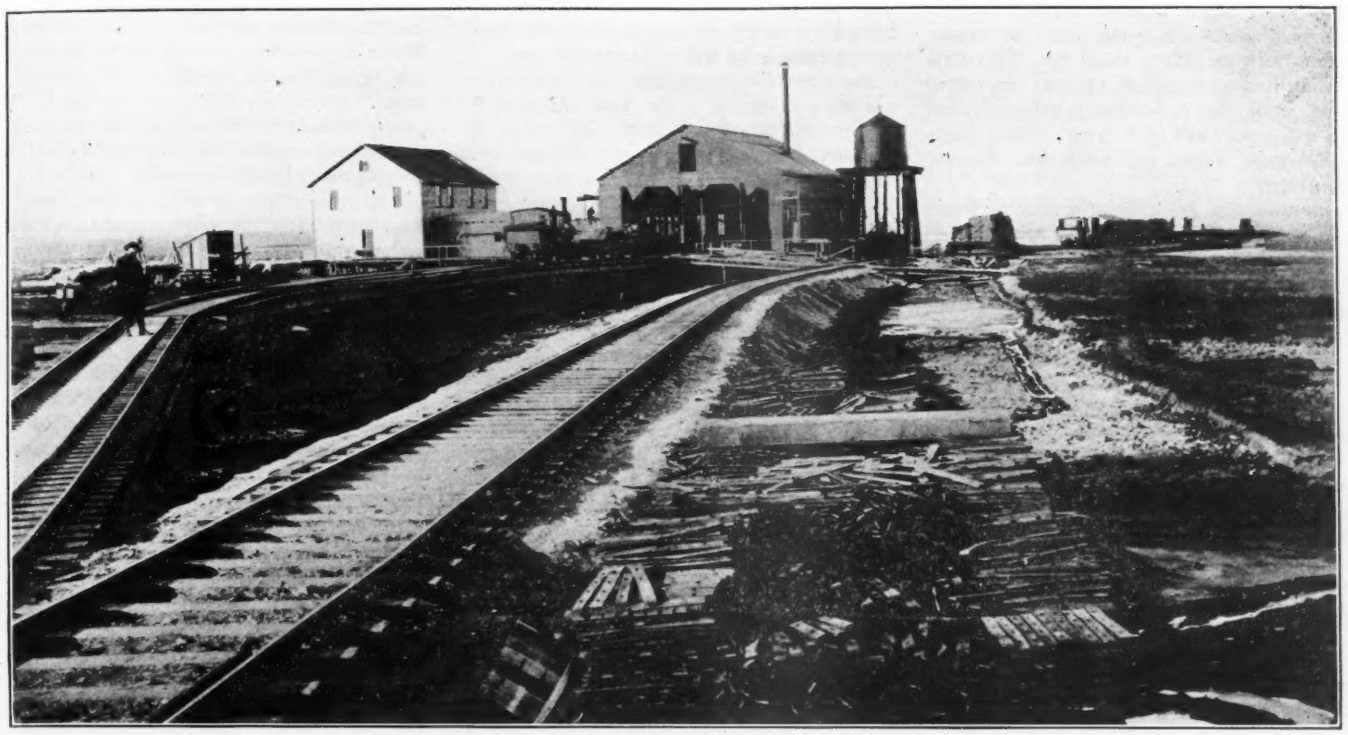
Among the general developments in the peninsula during the past season are the improvement in landing facilities at Nome (still, however, a difficult problem), the building of railway and roads, and the extension of the telephone system. The Wild Goose narrow-gauge railway, extending from Nome to Anvil, has done much to facilitate the handling of mine machinery. The Solomon & Council City railway, now under construction, will not

only afford good transportation facilities to its terminal, an important camp, but will give access to some important districts which lie adjacent to its route. The construction of petroleum tanks at Nome, connected with Anvil creek by a pipe line, gives promise of cheaper fuel.

have been in use for the past two years, and several are in process of construction. Among the largest of these are those planned to tap the great reservoirs of water found in the glacial-scoured amphitheaters and valleys of the Kigluaik mountains, some 40 miles north of Nome. As it has been definitely established

by pumping, at the present high cost of fuel.

The Nome district is probably more advanced in mining methods than any other of the peninsula. Water is furnished by the Miocene ditch at the rate of 2,000 to 3,000 inches, and in smaller quantities by others as well as by two large pumping plants, the Kelly on



COUNCIL CITY & SOLOMON RIVER RAILROAD, AT DICKSON, ALASKA.

HYDRAULIC ELEVATOR ON GLACIER CREEK, NOME, ALASKA.

The building of a number of ditches to bring water to the placer mines is, by all odds, the most important feature of the recent developments. The Miocene ditch and others

that these ditches can be constructed and maintained at reasonable cost, considering the price of wages, which are $4 to $5 a day, it is cheaper to employ ditches than to secure water

Nome river and one owned by the Wild Goose Mining Company on Snake river. Several hydraulic lifts and other labor-saving machinery have been introduced. While the bed of Anvil

creek has been entirely washed out, the benches are being actively exploited. It was one of these that yielded the $3,000 nugget, the largest that has been found in Alaska.

The high beach deposits between Dexter and Anvil creeks are being mined by underground methods. Many shafts have been sunk to a depth of 50 to 200 ft. through the frozen gravel until the pay-streak is reached, and then this is followed by drifting. These plants all use steam hoists and work both summer and winter.

The tundra or gravel-plain placers at Nome have been extensively prospected with the aid of churn drills. Some mining has been done with steam shovels and bucket dredges along the creeks which traverse these gravels; but the best method of mining these low-lying placers, which are unquestionably of great extent, has not yet been ascertained, though several strongly-backed companies are working toward that end.

In the Solomon river region the construction of the railway is to be considered the most important event of 1903. On Big Hurrah creek a small quartz mine, the only one in the peninsula, is being successfully operated. It is equipped with a ten-stamp mill run by a Pelton wheel in summer and a gas engine in winter, and sufficient ore of a free-milling character is in sight to make it a paying investment. Two steam shovels were used on the bars of Solomon river during the past season.

The Ophir creek district is second only to Nome in importance as a gold producer, the equipment of its placer mines including three hydraulic lifts, several inclines, derricks, etc. A large steam shovel has been in operation on the Niukluk river and is reported to be a success. The camp is connected with navigable waters of the Fish river by a short railway.

The other districts of the peninsula deserve only passing mention. At Topcock there was completed last summer a 12-mile ditch which will furnish the water to hydraulic a large deposit of rich gravels. In the Bluestone district, where a 2-mile ditch is used to furnish water, the most important recent discovery is the finding of gold on a bench 100 ft. above the present water level. The streams tributary to the north side of Grantley harbor have been known to carry gold-bearing gravels, and a ditch is now being planned to work these deposits, which are not of high grade.

The Kugerock district, because of its isolation, is the slowest of development. Many of its placers are a hundred miles or more from tidewater by the usual routes of travel, a fact which materially increases the cost of production. Work is still going on at Dahl and Harris creeks, and steps have been taken toward other developments.

The northeastern part of the Seward peninsula was the scene of considerable excitement during 1903, but work has not as yet been on an extensive scale. The shovel, pick and rocker still reign supreme, though the accessibility of the district from the Arctic Ocean and the richness and extent of some of the placers will soon lead to the use of better methods. Candle creek, discovered some two years ago, is still the chief producer, but its bed is being rapidly exhausted and more attention is being turned to the benches. An eastern extension of this district is found in the gold-bearing gravels of Bear creek, which flows into Buckland river. The most important discoveries of this field are the placers of the Immachuck, a river which has a length of 20 to 30 miles and flows through a broad flood plain. The gravels are from six to eight feet deep and in many cases have been found to carry good values. Though the developments of the past year have been chiefly of a preliminary character, considerable gold has been mined.

Some mention is due the tin deposits which are being developed in the York region at the western end of the peninsula. The stream tin, discovered in 1900, is being exploited in a small way, and 30 to 40 tons are said to have been shipped during the past summer. Besides the localities which are being mined, stream tin has been found at a number of other places, but its commercial value remains to be proved. Noteworthy is the finding of cassiterite in bed-rock on Lost river. The ore is disseminated through a granitic dike which cuts a crystalline limestone of Silurian age.

The tin deposits of Alaska were described by Mr. Arthur J. Collier in the ENGINEERING AND MINING JOURNAL of December 31, 1903.

The Yukon Basin.—Gold is widely distributed through the gravels of the Yukon basin, but aside from the discovery of the Fairbanks placers, there have been no important developments during 1903. As the deposits are, for the most part, remote from water transportation, there are scores, if not hundreds, of creeks whose gravels cannot be profitably exploited until better transport is available. The crying need of the region is for wagon roads, and it would be a great boon if funds could be raised by some form of taxation, preferably by changing the law so that a part of the assessment work required on placer claims could be commuted to a money tax; but there is small hope of effecting this unless Alaska's present bizarre civil administration is changed into some form of representative government.

All of the placer districts of the Yukon have shown a healthy growth during the past year. The high rate of wages, from $5 to $8 a day, with board, has led to the introduction of mining machinery and improved methods wherever conditions of transport and extent of deposits would permit. The men who have established these mining enterprises are worthy of the highest praise, for they have often worked in the face of the most adverse conditions. After a placer had been located and its commercial value proved, it usually takes a whole year to select the equipment and to ship it by water to the nearest point. The following winter the heavy material is carried to the claim by sleds, and the succeeding summer is required to install it. It is therefore two or three years before the miner can hope to have any return from his investment, which, as he usually has little capital, is apt to be a great hardship.

The Forty-mile district, which is the oldest in the Yukon basin, is still producing about $200,000 annually, and promises to increase its output. The old expensive hand work is being replaced by horse and steam scrapers and hoists. Of prime importance is the finding of gold on Chicken creek in benches 200 to 300 ft. above the present stream level. Similar benches on other creeks have not yet been prospected, but it is reasonable to expect that they, too, may carry gold in paying quantity.

One large hydraulic plant has been installed on American creek and two on Seventy-mile river, but none of these has been operated. The history of the Birch creek diggings is much the same as that of the Forty-mile region. Benches are being worked where creek beds have been exhausted. In the Rampart region two small hydraulic plants have been put to work, and others are in course of erection. The Baker creek region has as yet developed no rich deposits except those of Glenn gulch, which is already nearly exhausted. There are, however, a number of streams in the district where mining is going on in a small. way. The Fairbanks district of the Lower Tanana has already been referred to as promising important discoveries, but very few developments have been made.

The reports from the Koyukuk region have been very favorable, the product being estimated at $200,000 to $300,000. This, the most remote mining district of Alaska, lying far north of the Arctic circle, can be reached only by an overland trip of 200 miles, or by a steamer and small boat journey of 400 to 600 miles. The high cost of supplies and labor has made the net profit exceedingly small.

Coal and Petroleum.—The question of fuel supply is an all-important one to the mining interest. In the timbered areas of the Yukon and in part of the Pacific coastal belt the demand for fuel has been met by the local wood supply, but in the timberless areas, such as the Seward Peninsula, coal or petroleum has been imported at large expense.

The Mesozoic and Tertiary beds of the Yukon carry workable coal-seams of a fair semi-bituminous and lignitic character. Some prospecting has been done and one or two mines are equipped for supplying the river steamers with fuel, but operations have gone on only in a small way. The introduction of petroleum-burning fire-boxes on the steamers of the Northern Commercial Company has, for a time, somewhat checked the industry.

At Cape Lisbourne, on the Arctic Ocean, workable coal-seams of a good semi-bituminous character have long been known, and have offered an emergency fuel supply for both whalers and revenue cutters. More systematic attempts at mining, to supply the Nome market, 200 miles away, have not yet met with commercial success. Some little work was done at this locality last season, but practically no coal was shipped, the chief difficulty being the lack of harbor or proper shipping facilities.

Coal has been found at various points in the Alaskan peninsula, but it has been mined only in a small way during the past season. The extensive coal-mining plant at Homer, on Katchemak bay, does not seem to have been in operation during 1903.

Of considerable importance is the discovery at Comptroller bay, east of the Copper river delta, of commercial coal which is known to occur in large quantities and is of the highest grade yet found on the Pacific coast. It lies from 20 to 30 miles inland, and lack of a proper harbor will make the transhipment difficult.

The petroleum deposits of Alaska have been rather more widely advertised than their present development would seem to warrant. Drilling operations have been carried on at three general localities near Comptroller bay, in what is variously known as the Kayak or Katella oil field; at Eneshin bay on Cook Inlet; and at Cold bay on the east side of the Alaskan peninsula. It is of interest to note that important oil seepages occur at all three of these localities, and that the bed-rock of all three belongs to the same horizon. While the indications seem to be favorable, at only one well, situated in the Comptroller bay region, has there been any flow of oil.

FATAL ACCIDENTS IN METAL MINING IN THE UNITED STATES.

By FREDERICK L. HOFFMAN.

The hygiene of metal mining in the United States has never received the consideration of which the subject is deserving. Of the total number of men employed in mining in this country, approximately 36 per cent are metal miners, and 64 per cent are coal miners, but thus far the writers on the hygiene of mines have confined their observations almost entirely to coal mining, and we find little of determining value regarding the health conditions and mortality of men employed in the metal mines of this country in the literature of the subject. An early attempt in this direction was made in the 'Report on Comstock Miners,' published under the direction of Mr. Clarence King in 1883; but the monograph of Mr. Lord is of more interest than value at the present time in view of the many radical changes that have been made in mining methods during the past twenty years. A brief discussion of the hygiene of metal mines will also be found in the second volume of Buck's 'Hygiene and Public Health,' published in 1879, but the article by Mr. C. R. Raymond is subject to the same criticism in that the early data are not quite applicable to present-day conditions. Mr. Raymond relied, in a large measure, upon the data and observations of the British Commission on the health of metal miners, published in 1864, which, it is hardly necessary to say, require to be replaced by data representative of conditions existing in this country at the present time.

The mortality of metal miners has attracted attention for many years, but the only comprehensive data on the subject are the statistics published by the Registrar-General of England and Wales. The following table is extracted from the report for the three years 1890-1892, which is the latest official publication regarding the health of men in different occupations. The table shows the death rate per 1,000 of miners employed in the extraction of different metals, and for the purpose of comparison the mortality rate of coal miners and of men in all occupations have been included.

Comparative Mortality of Miners, England and Wales—1890-1892—All Causes.

Ages.	Coal.	Copper.	Tin.	Lead.	All occupations.
15-19	3.8	——	3.0	3.0	2.6
20-24	5.6	8.0	7.0	6.5	5.1
25-34	6.3	9.4	8.1	9.5	7.3
35-44	9.6	18.1	14.3	13.5	12.4
45-54	19.4	24.3	33.2	23.9	20.7
55-64	43.8	46.7	66.1	66.6	36.7
65+	146.4	173.5	181.9	245.2	102.3

According to this table the mortality of metal miners is higher than the mortality of men in all occupations and at all age periods. If comparison is made with the mortality of coal miners it appears that the rates are much lower than for men employed in the mining of copper, tin, or lead. At ages 25-54 in fact, the mortality of coal miners is below the rate for men in all occupations. These statistics are quite significant and they indicate a very considerable waste of life resulting from unfavorable conditions incident to the metal mining industry, conditions apparently much more serious in their relation to health and longevity than the recognized unfavorable surroundings affecting the health of coal miners.

Since a considerable portion of the excessive mortality of metal miners is due to respiratory diseases, I have prepared a table showing the mortality per 1,000 of men employed in the different branches of the mining industry.

Comparative Mortality of Miners, England and Wales—1890-1902—Respiratory Diseases.

Ages.	Coal.	Copper.	Tin.	Lead.	All occupations.
15-19	0.31	——	0.28	0.50	0.26
20.24	0.64	2.67	0.41	0.43	0.61
25-34	0.91	3.13	0.51	0.81	1.13
35-44	2.11	2.27	3.15	2.40	2.50
45-54	5.70	8.83	9.53	5.89	5.15
55-64	16.48	14.86	22.51	22.68	10.32
65+	49.97	50.23	57.25	71.63	25.91

With unimportant exceptions the rates are much higher for metal miners than for coal miners, and this is especially true of persons employed in lead mining. For illustration: At ages 55-64 the mortality of lead miners from respiratory diseases was 22.68 per 1,000, against 10.32 for men in all occupations and 16.48 for coal miners.

The foregoing data would seem to warrant the conclusion that the conditions of life surrounding metal miners in the pursuit of their occupation are such as materially affect their health and longevity. A detailed discussion of the diseases of miners, however, does not fall within the scope of this paper.

Aside from the ill-health producing conditions apparently inherent in the metal mining industry, the fatal accident liability of the men employed is quite considerably in excess of the corresponding mortality of coal miners. Unfortunately, we have not very satisfactory data for the different States of this country, but such information as could be obtained by correspondence or from official published reports, is incorporated in this paper. The table which follows will show the fatal accident liability of men employed in copper mining in *Houghton county, Michigan,* during 1889-1903.

Fatal Accidents in Copper Mining Houghton County, Michigan, 1889-1903.

Years.	Number employed.	Number killed.	Rate per 1,000.
1889	6,480	21	3.24
1890	7,310	35	4.79
1891	7,702	28	3.64
1892	7,640	21	2.75
1893	7,591	23	3.03
1894	7,348	22	2.99
1895	7,249	46	6.35
1896	8,170	19	2.33
1897	8,726	26	2.98
1898	10,469	23	2.20
1899	13,051	27	2.07
1900	13,971	36	2.58
1901	13,498	33	2.44
1902	14,130	44	3.11
1903	13,629	33	2.42
1889-95	51,320	196	3.82
1896-02	82,015	208	2.54
1898-03	146,964	437	2.97

It is shown by this table that the fatal accident rate has varied from 6.35 per 1,000 of men employed in 1895 to 2.07 in 1899. The average for the fifteen years under observation was 2.97 per 1,000. If we exclude the last year and consider the previous fourteen years in two periods, the rate has decreased from 3.82 per 1,000 during 1889-95 to 2.54 during 1896-1902. As far as it is possible to judge from these data, there has been a considerable and gratifying decrease in the average accident liability of men employed in the copper mines of Houghton county, Michigan, since 1895.

Information as to the causes of fatal accidents in copper mining in Houghton county, Michigan, is available to me only for the years 1890, 1895, 1900 and 1901. During these four years there were 150 deaths attributed to the following causes, arranged in the order of their importance.

Causes of Fatal Accidents in the Copper Mines of Houghton County, Michigan, 1890, 1895, 1900 *and* 1901.

Cause.	Number killed.	Per cent.	Rate per 1,000 employed.
Falls of rock	47	31.33	1.12
Asphyxiation	34	22.67	0.81
Falls down shaft	21	14.00	0.50
Explosions	19	12.67	0.45
Skip and car	16	10.67	0.38
Other misc'l's accidents.	13	8.66	0.31
Total	150	100.00	3.57

Of the total mortality 31.33 per cent was due to falls of rock, 22.67 per cent to asphyxiation, 14 per cent to falls down shaft, and 21.67 per cent to explosions. Since the percentage of distribution of deaths from different causes depends, to a certain extent upon the number employed, I add a column showing the mortality from each group of causes per 1,000 employed during the period under observation. No information as to the occupation of the killed is available for the copper mines of Houghton county, Michigan.

For *Montana* we have a record for only ten years, and unfortunately, no distinction is made between the different kinds of metal mined. The return is, therefore, for the metalliferous mines in general, but is of sufficient interest and value to be incorporated in this report.

*Fatal Accidents in Metal Mining, Montana—*1893-1902.

Years.	Number employed.	Number killed.	Rate per 1,000.
1893	5,312	29	5.46
1894	7,082	27	3.81
1895	8,758	41	4.68
1896	7,727	64	8.28
1897	9,825	52	5.29
1898	11,096	48	4.33
1899	12,316	49	3.98
1900	13,996	47	3.36
1901	12,078	35	2.90
1902	13,784	47	3.41
1893-97	38,704	213	5.50
1898-02	63,270	226	3.57
1893-02	101,974	439	4.31

It is shown by this table that the rate has varied from 8.28 per 1,000 in 1896 to 2.90 in 1901.. The average accident mortality for the entire period was 4.31 per 1,000, or quite considerably in excess of the average for Houghton county, Michigan. The rate is shown to have decreased from 5.50 per 1,000 during 1893-97 to 3.57 during 1898-02. While the decrease in the accident liability is apparently evidence of improved conditions the rate continues high and quite considerably above the average of 2.54 per 1,000 for Houghton county, Michigan, during the seven years 1896-02.

Our information as to the causes of fatal accidents in the metal mines of Montana is limited to the years 1893, 1895, 1897, 1898, 1900, 1901, and 1902. During this period there occurred 321 deaths. The facts are set forth in the following table:

Causes of Fatal Accidents in the Metal Mines of Montana, 1893, 1895, 1897-98 *and* 1900-02.

Cause.	Number killed.	Per cent.	Rate per 1,000 employed.
Falls of rock, etc.	92	28.66	1.23
Falls down shaft, etc.	77	23.99	1.03
Explosions, blasts, etc.	63	19.63	0.84
Cage accidents	26	8.10	0.35
Asphyxiation	21	6.54	0.28
Car and skip accidents	12	3.74	0.16
Drowned	5	1.56	0.07
Scalded	4	1.24	0.05
Other misc'l'ous causes.	21	6.54	0.28
Total	321	100.00	4.29

During the period under observation there occurred 321 deaths, and of this number 28.66 per cent were due to falls of rock, etc., falls down shaft, etc., caused 23.99 per cent of the total mortality, and explosions, blasts, etc.,

19.63 per cent. To facilitate ready and accurate comparison with returns for other States, the accidents due to each group of causes per 1,000 of employees have been given.

For *Colorado* we have a record for only seven years, covering the period 1896-1902. The data are set forth in detail in the following table:

Fatal Accidents in Metal Mining, Colorado, 1896-1902.

Years.	Number employed.	Number killed.	Rate per 1,000.
1896	25,545	97	3.80
1897	29,215	110	3.77
1898	30,231	108	3.57
1899	39,210	103	2.63
1900	40,111	107	2.67
1901	37,260	121	3.25
1902	35,118	82	2.33
1896-02	236,690	746	3.15

The average rate during the period was 3.15 per 1,000, having been 3.80 in 1896 and 2.33 in 1902. There is some evidence of a decrease in the fatal accident liability of metal miners in Colorado, but the average rate is 0.61 per 1,000 higher than the corresponding average for Houghton County, Michigan, during 1896-1902.

We have information as to the causes of accidents in metal mines in Colorado for the years 1896-1902. During this period there were 728 deaths. The facts are set forth in detail in the following table:

Causes of Fatal Accidents in the Metal Mines of Colorado, 1896-1902.

Cause.	Number killed.	Per cent.	Rate per 1,000 employed.
Explosions	192	26.37	0.81
Falls of rock, etc.	166	22.80	0.70
Falls down shaft, etc.	176	24.18	0.74
Other shaft accidents	74	10.16	0.31
Asphyxiation	62	8.52	0.26
Machinery	24	3.30	0.10
Cars	10	1.37	0.04
Other misc'l's accidents.	24	3.30	0.10
Total	728	100.00	3.08

According to this table, explosions caused 26.37 per cent of the deaths, falls of rock, etc., 22.80 per cent, falls down shaft, etc., 24.18 per cent, and other accidents 10.16 per cent. The mortality from each group of accidents per 1,000 employees admits of easy and accurate comparison with the corresponding returns for other States, although it is safe to say that the classification of causes of accidents is somewhat arbitrary, and the groupings are not in all respects exactly identical. The differences in classification, however, are not sufficient to seriously affect the more important groups of causes.

(To be continued.)

IRON AND STEEL BUILDINGS.—According to Professor Ketchum, in his treatise on the design of steel mill buildings, the minimum size of angle bars to be employed in the construction of such buildings should be 2 by 2 by 0.25 in., and the minimum thickness of plates 0.25 in. for both permanent and temporary structures. Wherever the metal is to be subjected to corrosive gases, as in train sheds and smelter buildings, the ordinary allowable stresses should be decreased 20 to 25 per cent, and the minimum thickness of metal increased 25 per cent, unless the metal be fully protected by an acid-proof coating. The best paints at present in use do little more than delay and retard corrosion. The minimum thickness of corrugated sheet steel for roof covering should be No. 20 gauge and for the sides of buildings No. 22 gauge, but where there is certain to be no danger of corrosion, Nos. 22 and 24 may be used for the roof and sides, respectively.

PROGRESS OF THE ZINC INDUSTRY IN MISSOURI DURING 1903.

By FRANK NICHOLSON.

During 1903 the production of zinc ore in the Joplin district showed a falling off of 57,099,130 lb. as compared with the output for 1902. The production by camps is shown graphically in the accompanying chart.

The 1903 production is the smallest since 1897. The total value of the lead and zinc output of the district was $9,443,917. As compared with 1902, the district showed a falling off of 57,990,130 lb. in the output of zinc ore and 6,566,980 lb. lead ore; but the value for 1903 was greater by $13,127. The following table shows the production for the past seven years, in pounds:

Year.	Zinc ore.	Lead ore.
1897	355,951,060	60,290,000
1898	470,142,000	52,914,980
1899	511,667,470	48,212,720
1900	484,660,410	59,013,390
1901	516,612,270	70,530,450
1902	525,090,880	63,230,840
1903[1]	467,991,750	56,663,860

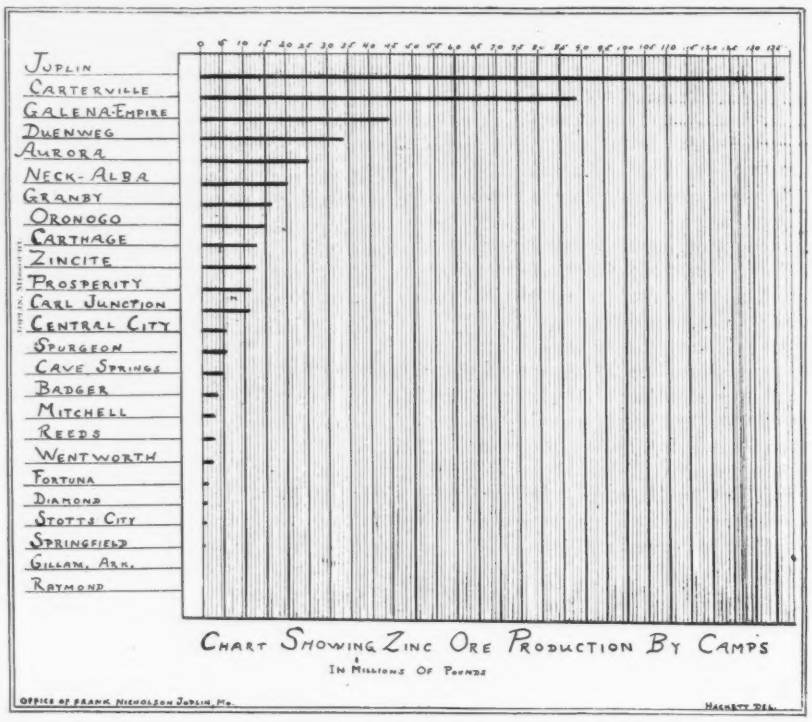
[1]Joplin papers report zinc ore 469,465,710, and lead ore 56,875,190; but errors have been found in their figures, and the totals given are more nearly accurate.

The year 1903 has been the most prosperous in the history of the Joplin district in spite of the fact that the year opened and closed with low prices and gloomy anticipations. The ore producer has a short memory. Year after year prices sag about the first of October and begin to recover after the first of the year, owing to the fact that, as a rule, the galvanizing works are closed down during this period for repairs and new contracts for the year's consumption are generally made in January; but at each recurrence of low prices the producers become panic stricken, and on all sides is heard the gloomy forebodings that "the bottom has dropped out of the zinc industry." The year opened with an assay basis price of $30 to $31 per ton for 60 per cent ore. During the corresponding week of 1901 the price was $2.50 per ton less. The price rapidly rose to $34 basis and $37 top before the end of the month. Further improvement brought the basis up to $37 per ton with top price $41.50. Prices remained excellent until October, when they began to recede. About the first of December the assay basis ranged from $26 to $31 per ton for 60 per cent ore. The reaction from these low prices began about the middle of December, and the year closes with a strong market at $32 basis.

The average top price for 1903 was $38.76, while the average basis price for 60 per cent ore was $34.40 per ton. Lead ore averaged $54.06 per ton for the year.

A shut-down of three weeks, which curtailed the production about 8,000 tons, reducing the possible surplus by this amount, was instrumental in causing the reaction in prices to come earlier than in previous years.

The Missouri-Kansas Zinc Miners' Association, acting in comparative harmony, caused a shut-down of fully 70 per cent of all the mills in the district for a period of three weeks. Of course the three weeks' shut-down, had it been observed by every mill in the district, would not have caused a curtailment of the annual output to the extent represented by three full weeks of work, as most mines were doing development work during the shut-down, cleaning ponds, putting their mills into perfect order, and generally putting the property in shape to produce more than the normal output of ore when the mill should start up again.



No ore was exported, for the reason that it was impossible to induce producers to export at a loss. Most of the well-organized industries export their surplus production at prices very considerably below the figure obtained in the home market; and, as a rule, the more thorough the organization of an industry, the more extensively is this principle acted upon.

It is reasonable to believe that were no copper exported, the home price for the metal would soon be identical with the cost of production. The United States Steel Corporation sells its rails in the home market at $28 per ton, while for export these can be obtained at $19 a ton. Until the Joplin producer can recognize the necessity of getting rid of the surplus production by exportation, it seems probable that the low prices appearing about the date of expiration of contracts will continue to be a thorn in his side.

In my review for 1902, I called attention to the fact that both mining and milling practice were undergoing gradual changes tending toward the adoption of better appliances and improved methods. These changes are so gradual as scarcely to attract notice, and are largely the outcome of the more extensive working of the sheet-ground formation. The sheet ground in Joplin is the hardest mining ground with which I have any acquaintance. It is a fine-grained chert requiring the heaviest type of machine drills and large quantities of high explosives for its economic extraction. The average sheet-ground mine, which furnishes ore for a 100-ton mill, requires four machine drills and a weekly consumption of 1,050 lb. of powder. The actual amount used varies from 800 lb. to 1,250 lb. per week. The chert is extremely destructive of steel; and the wear on the drills is so great that they must be replaced every year. In the mill the roll shells, which last from six weeks to three months on ore from other mines, are worn out in 26 shifts when working on the sheet-ground ore.

The most important development during the year has been on the Aylor ground, near Prosperity. The group of mills including the Avondale, Holy Smoke, Chapman and one or two others, have contributed to the output of the Carterville district more than 500,000 lb. a week. These ore-bodies are huge cavern deposits from 50 to 100 ft. in thickness, and having the irregular windings of an underground water-course. The ore is of medium grade, averaging about 58 per cent metallic zinc, and about 2 per cent of metallic iron.

With the exception of the strikes on the Aylor land and the Eleventh Hour lease, no large bodies have been uncovered during the present year. The Brooklyn mine at Duenweg, which began production November 15, 1902, has been a steady producer at the rate of 35 tons per week, which production has been largely increased during the last few months.

As stated above, the shortage in zinc production for 1903 as compared with the previous year is 57,099,130 lb. There seems to be every reason to believe that the 1904 output will show a further falling off of at least as much. The simple fact is that the old mines are being worked out much faster than new ones are being opened up. The higher prices for all mining supplies and the necessity of working hard sheet-ground deposits have so greatly increased the cost of ore production that there is but little encouragement to operate a zinc mine at current prices for ore, notwithstanding the fact that present prices would some years ago have been deemed highly satisfactory.

When it is considered that the average content of 'jack' in the crude ore does not exceed 5 per cent, and that of this 5 per cent at least 1.5 per cent is lost in the tailings, leaving an average of 3.5 per cent, it can readily be seen that at the present prices the average mine in this district has a difficult task to meet expenses.

In my opinion, the average cost of producing 60 per cent ore in the Joplin district, including royalty, is not less than $30 per ton. Of course, some mines can produce as low as $10 per ton; and almost any mine can cite special weeks in the year when the cost was far below $30; but I am convinced that the average cost for all operating mills in the Joplin district is not below the figure named. To greatly stimulate production in this district will require a basis price of not less than $40 per ton. This would admit of the working of many sheet-ground mines that are now idle. It seems reasonably certain that a large proportion of the future output must come from the sheet-ground which, though lean, is of wide extent and of wonderful uniformity.

THE METAL PRODUCTION OF IDAHO.

Mr. Robert N. Bell, State Inspector of Mines, informs us that the total output of metals for the State of Idaho for the year 1903 was as follows: Gold, fine oz., 92,938; silver, fine oz., 7,224,022; lead, lb., 220,857,956; copper, lb., 2,524,000.

WALLACE, IDAHO, IN THE CŒUR D'ALENES.

Of the above output, the Cœur d'Alene district alone produced 213,520,000 lb. of lead and 5,750,000 oz. of silver; thus supplying 96.7 per cent of the lead, and 79.6 per cent of the silver.

THE UTILIZATION OF WATER-POWER IN ITALY.—According to the *Electrical Review*, the development of water-power for electro-chemical and electro-metallurgical purposes has made more progress recently in Italy than in any other country of Europe. Since 1897 eleven electro-chemical companies have been organized, with a total capitalization of $6,000,000. French and German capital is largely interested in these ventures. The Italian Electro-chemical Company owns two water-power concessions in the southern provinces; one at Bussi, on the river Ticino, is rated at 6,000 h. p., and the other, on the Pescara river, at 38,000 h. p. Caustic alkalies and bleach are produced. Owing to insufficient capital the company has become involved in financial difficulties, and it has been necessary to write down the original value of the shares by 40 per cent, and to issue a large amount of new stock. It is believed by competent authorities that with proper attention to the technical and financial sides of the business the ventures will eventually prove successful.

RECENT DEVELOPMENTS IN THE PORTLAND CEMENT INDUSTRY.

By Robert W. Lesley.

The opening months of the year 1903 showed a continuance of the great demand for portland cement which had marked the close of 1902. The dealers and manufacturers were beset with inquiries for large quantities of material upon contracts for work to be done during the year, and the indications were that there would be a repetition of the conditions of the previous year, in the shape of a shortage in supply and an increase in demand. All the mills were driven at their full capacity and many new cement works were rushed to completion, while others were rapidly planned, with the object of getting a share of the large business offered. With the coming of May, labor conditions became unsettled, strikes in the building industry began in all parts of the country, operations in the large cities were almost entirely stopped, and the planning of new buildings and important structures came to an end. The effects of all this upon the cement industry were soon perceived, and many of the mills which had held their stocks for the high prices which it was believed the cement would realize during the summer and fall months found themselves confronted with large quantities of material on hand and a diminishing market. In a very short time prices fell off, so that at the beginning of the autumn very low figures were made; many of the new cement enterprises were abandoned, and a large number of the mills suspended operations, pending the disposing of the stocks of cement on hand. Needless to say that the price of cement continued to decline, and at the time of the annual meeting of the Association of Portland Cement Manufacturers, which was held in New York on December 8th, the lowest prices of the season were made. At this meeting, which was attended by representatives of 45 cement manufacturing companies, figures were given which showed the total quantity of stocks of cement on hand at

the mills of the manufacturers on December 1, 1903. The quantity, it was expected, would be very large, but when the figures were compiled it was found that the total stocks on hand, at the date mentioned, were 1,243,933 barrels, or about a month's consumption of the United States.

The question of statistics of the cement industry has given the association considerable thought. During the year there have been sent to all the members reports of the United States Bureau of Statistics, showing the imports and exports of cement, and from these it has been possible to gather some idea of the conditions of our foreign trade, and of the effect of foreign importations upon our domestic industry. Following this line of thought, it has been decided that the association should be made the center of the cement statistics of the United States, and that upon the plans used by the Iron & Steel Association there shall be received by a statistician, to be appointed, monthly or quarterly reports of the stock of cement on hand and of the number of kilns that are in operation, and that these figures shall be tabulated, not according to mills, but according to the districts in which the mills are located, thus enabling the trade to know the condition of stocks on hand and kilns in operation from time to time, as bearing upon the general cement situation in the country.

Another matter which has received the attention of the association is the adoption of standard specifications for cement. In my report as first president of the association I have summarized the progress thus far made in dealing with this important subject. It may also be of interest to your readers to learn that the association will be represented at the St. Louis Exposition by a collective exhibit in a special building. A large sum has been raised for the purpose, and a concrete structure is to be erected, the work being done during the progress of the Fair itself, in order to display to the many visitors the various uses of portland cement, and the rapidity with which work of this kind can be constructed. The building, when completed, will have within its walls separate exhibits of the various manufacturers represented in the association, a completely equipped standard testing laboratory for the purpose of testing cement in all its forms under standard specifications; and in addition to this, there will be a large courtyard, where various styles of concrete floors, walls, and other architectural constructions will be shown.

During 1903 a number of new mills were brought into the productive state in many parts of the country. The Lehigh district, as usual, contributed its fair proportion of the additional output. The capacity of the Michigan mills was also largely increased, as was that of the mills in the Indiana field. While accurate figures of the total output of portland cement for the year 1903 are not as yet accessible, it is estimated that the production for the year 1903 was, in round figures, about 19,000,000 bbl., and that of this production the Lehigh and New Jersey regions furnished, as a whole, in round figures, nearly 60 per cent. There were imported during the ten months ending October 31, 1903, 2,171,523 barrels, so that the total consumption of portland cement in the United States for the year 1903 may be estimated at over 21,000,000 barrels. During the ten months ending October 31st, there were exported 587,844 barrels. The noticeable fact in the cement trade during the autumn months of 1903 is the marked diminution in imports and the marked increase in exports. The imports for the months of November and December are expected to be very light, and, when the figures are furnished, are not likely to materially increase the total above given.

That the future of the portland cement industry is fairly well assured, so far as the old and tried brands are concerned, may be gathered from the fact that every period of depression in prices has been marked by a period of increased new uses for cement, and that whenever the price for portland cement falls materially the employment of that cement in the shape of concrete construction in many new fields almost immediately follows.

In order to exemplify the growth of the industry in the United States, some figures are here given which show the increase in the consumption of cement, both portland and natural, per capita of population, during the period from 1850 to 1902. This growth, it will be noted, is quite remarkable, and the increased consumption between the years 1900 and 1902, when prices were at a very low level, well illustrates the thought above expressed.

Growth of the Consumption of Cement in the United States.

Year.	Pounds per capita.
1850	6.46
1860	10.49
1870	12.77
1880	13.04
1890	33.93
1900	91.82
1902	119.00 (estimated).

While the growth of the portland cement industry has been, as above stated, very large, and is constantly increasing, the same cannot be said of the natural cement industry, which had its origin in this country at the time of the construction of the many canals forming the first means of transportation in the United States. These cements, of the character of the Rosendale, Louisville, Milwaukee, Cumberland and Lehigh natural cements, have been used for more than 50 years with entire success, and there is no record of any failure. With care in their manufacture there is no reason why their consumption should not increase. In cases of large masonry dams, it has been found that the substitution of the natural cements for portland cements enabled much larger bodies of masonry to be constructed at the same cost, thus adding to the stability of the structure and giving the same strength. The American natural cements, as well as the American portland cements, have established a world-wide reputation, and manufacturers from foreign countries are finding their way here to study the methods used in the modern well-equipped plants of the cement trade.

COST OF DRAFTING FOR IRON AND STEEL STRUCTURAL WORK.—Professor Ketchum, in his treatise on the design of steel mill buildings, states that the cost of making details for the headworks of mines is from $4 to $6 per ton; for churches and courthouse roofs, having hips and valleys, from $6 to $8 per ton; for ordinary mill buildings from $2 to $4 per ton; the details for all the work done in a year by a large structural concern were contracted at $2.06 per ton, which price netted the contractor a fair profit. The details for the buildings for the Basin & Bay State smelting plant at Basin, Montana, containing 270 tons of steel, cost $2 per ton.

GOLD DREDGING.

By F. WINTER TAYLOR.

My personal knowledge of dredging was acquired mainly in connection with operations upon the Macquarie river, in New South Wales. I am authoritatively informed, however, that the methods employed there are similar to those used in other parts of the world, varying only as regards the structural strength of the dredge and its machinery, according to the nature of the country through which it has to work its way. Therefore, in describing gold-dredging according to my own experience, I shall be giving a description which will have general application.

New Zealand.—The birthplace of gold-dredging is admittedly New Zealand. There it is pursued with great vigor, and operations are not confined merely to the inland waters, as is the case in most of the other countries where dredges are at work, but are also extended to the shallows of the ocean itself on some parts of the coast. There are probably 500 dredges now working in New Zealand. Many also are now actively engaged in winning gold in the various states of Australia, in British Columbia, in Africa, in Siberia, in China, and in other parts of the world.

The gold sought for and obtained is, of course, entirely alluvial. It was known years ago by mining engineers that the maximum amount of gold is to be found on the bed-rock of the rivers, while in the gravel above it exists in comparatively small quantities. Before the advent of the dredge, however, and in those days when it entailed very great expense to undertake an engineering project of any magnitude in a comparatively undeveloped country, it was a matter of the greatest difficulty to obtain the gold from off the bed-rock itself. Many attempts were made to do so, but these were for the most part unsuccessful, and usually resulted in loss of life and capital. The advent of the dredge was, therefore, singularly welcome.

Early Types.—The first type to be employed was the spoon dredge, whose essential feature was merely one grappling bucket, which was lowered to the bottom of the river, filling itself with gravel, and was then hoisted to the surface, where it was relieved of its contents, the gravel being washed in a primitive manner. It is not necessary, however, to make more than this passing reference to the spoon type of dredge, nor to any interemediate types.

Modern Type.—The modern steam dredge is very similar to the familiar harbor dredge, with the addition, of course, of the proper appliances to secure the gold and to cast aside the gravel when washed.

Hull or Pontoon.—The hull is a flat-bottomed iron or wooden pontoon, about 100 ft. long and 40 ft. wide, and its shape is as shown in Fig. 1. The space marked *A* allows the ladder to be raised and lowered.

Power is supplied by an engine of (usually) 50 h. p. By countershafting, pinions, etc., details of which it is unnecessary to give, the crown-wheel is operated; it is keyed on the same shaft as the top 'tumbler.'

Top Tumbler.—This is (as shown in Fig. 2) merely a heavy square iron casting (the length of the sides of the square being generally 5 ft.) which, as it revolves, carries around the buckets. A heavy shoulder is arranged on each side of the tumbler to prevent lateral motion of the buckets. It will readily be understood that each bucket, on ascending

the ladder, reaches the top tumbler, and at first remains in the same line as the rest of the ascending buckets. As, however, the tumbler makes a quarter of a revolution, the bucket is thrust into a vertical position, with its mouth downward. Another quarter revolution of the tumbler causes the bucket to take its place in the sag of the endless chain of buckets descending to the river bottom. On reaching the bottom, each bucket, coming against the face of the ground being worked, fills itself with gravel and is hauled around the bottom tumbler, which is at the lower end of the ladder, and is similar in construction to the top tumbler. Its action merely differs in that it receives its motion from, and does not impart motion to, the buckets.

Ladder.—The ladder is a strong girdered and braced structure about five feet wide and four feet deep; its length varies in almost every dredge, according to the previously ascertained distance between the surface of the water and the bed-rock. Along the top surface of the ladder are, at intervals of 5 ft., massive iron rollers, over which the buckets make their way. The upper end of the ladder is pivoted on the same shaft as that on which the top tumbler is keyed. The lower end is suspended, by means of heavy steel wire passing through triple-purchase blocks, from an iron bridge which is built on the front of the pontoon. The bight of this tackle is taken to a winch, and the depth of the ladder is thereby controlled.

Buckets.—The body of the buckets (Fig. 3) is built of sheet iron ¼ in. thick., suitably riveted. The height of a bucket at the mouth is 3 ft., and at the rear 2 ft. The length is 4 ft., and the breadth at the widest part 3 ft.

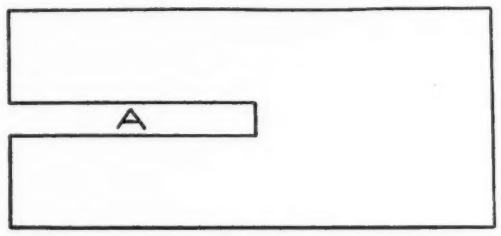


FIG. 1.

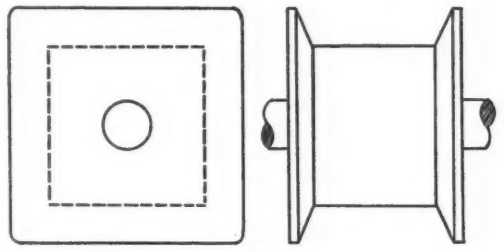


FIG. 2.

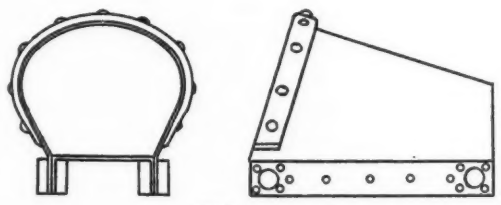


FIG. 3.

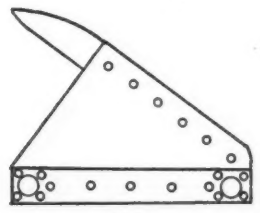


FIG. 4.

The mouth is protected by a heavy lip, which bears the brunt of the shock consequent upon a bucket striking the face of the gravel. The whole body is riveted at the bottom to steel runners, which pass over the rollers on the ladder. At each end of the runners is a 2-in. hole through which is passed a pin connecting the bucket to a link, the other end of which, in turn, is connected in a similar manner to the next bucket of the series.

Grab-Hooks.—There are usually 38 buckets of the above-described kind. Two smaller ones of a different type, called grab-hooks (Fig. 4), are placed in the chain, thus: First, 19 ordinary buckets, then a grab-hook, then 19 more buckets, and then the second grab-hook. These latter have only about one-half the capacity of the ordinary buckets, but projecting out toward the front are two massive pointed horns of iron, the function of which is to bury themselves deeply into the face and to loosen a considerable quantity of gravel when rough ground is being worked. They are, in effect, the picks of the dredge, whereas the other buckets are the spades. All the buckets are connected in an endless chain by links and pins.

Chute and Screen.—On reaching the upper end of the ladder, and passing over the top tumbler, each bucket in turn discharges its contents into an iron chute, which leads into a large revolving cylindrical screen (Fig. 5). This screen is open at both ends, is 6 ft. in diameter and 20 ft. long. It is pierced by innumerable small holes, through which pass the gold and the smaller particles of gravel. The end of the screen into which the gravel is discharged from the chute is slightly higher than the further end, so that that portion of the gravel which is too coarse to pass through the small holes in the screen is gradually worked toward the lower end. This action is assisted by a steel rail, which is fixed circumferentially inside the screen, but passing diagonally across its pierced plates from end to end, thus forming a worm. Strong streams of water are directed by means of a centrifugal pump onto the gravel while it is in the screen, thus washing the gold and fine gravel through the small holes.

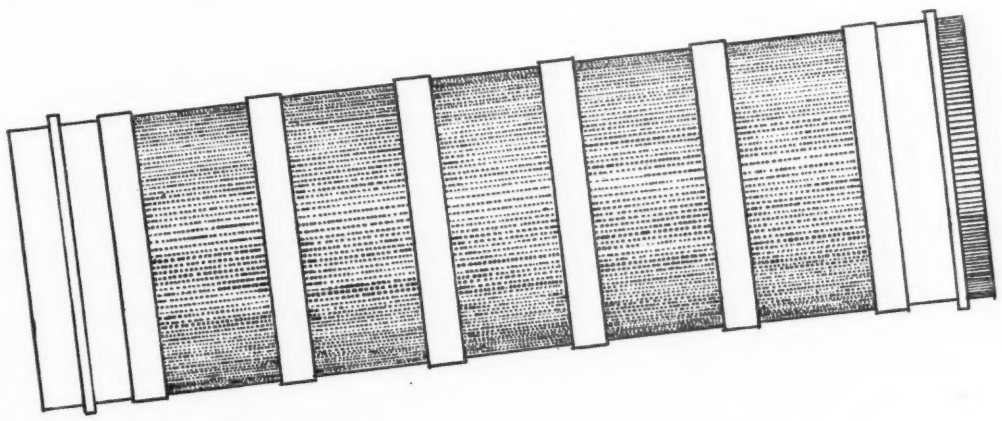
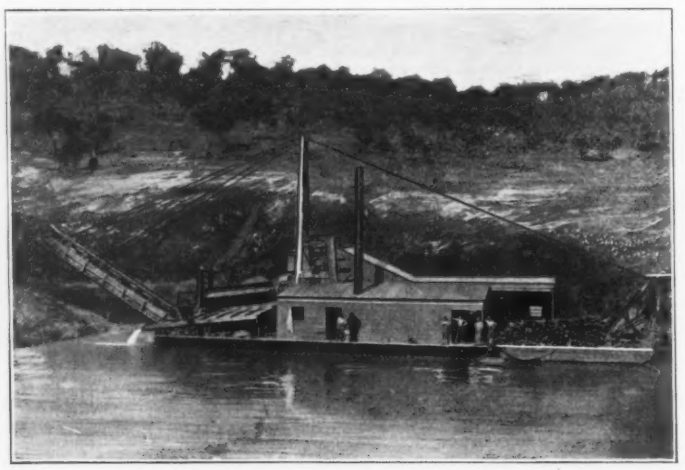


FIG. 5.

Tables.—Directly underneath the revolving screen (through its entire length) are sloping tables. These are wide, flat wooden structures, inclined so that the water played onto them

flows away readily into sluices, whence it passes into the river. On the tables are firmly fixed the following materials to catch and retain the gold: firstly, a layer of calico; secondly, and on top of the calico, a layer of cocoanut matting; thirdly, and on top of the matting, sheets of expanded metal. Every few days the working of the dredge is suspended for a short time in order that these materials may be taken up and thoroughly washed in a large gold-box, in which the precious metal is stored as long as the owners may wish. It is afterward 'panned out' and retorted in the usual manner.

Elevator.—The coarse gravel and large stones are discharged from the lower end of the screen into small buckets revolving in an endless chain on the elevator, which is a ladder (somewhat similar in construction to the main ladder already described) about 30 ft. long, permanently fixed at an angle of about 30° as regards the water. These buckets discharge the waste gravel or tailings into the river behind the dredge. As the majority of the rivers worked by dredges are rarely navigable, and are usually merely a succession of small lakes connected by a shallow stream, it will be seen that the dredge practically carves its own way out of solid ground, and fills in again behind itself, thus taking along its own water. A narrow channel is, however, generally left at one side of the river.



GOLD DREDGE AT WORK.

Guiding the Dredge.—The guiding of the dredge from side to side of the river, and ahead after a cut is finished, is accomplished by means of steel mooring lines wound on the drums of steam-driven winches on the dredge, the other end of each line being tethered to the shore by means of anchors sunk in the river's banks. These anchors have to be moved ahead from time to time as the dredge progresses. There are five mooring lines employed: one head line, two bow lines, and two quarter lines.

Making a Cut.—The manner of manipulating the dredge when making a cut is as follows: The cut is started at one side of the river. The ladder is slowly lowered until the lower end touches the face to be worked. The buckets are then set in motion, and it is possible to judge, by the amount of gravel coming up in them, whether the cut is being made too deep or too shallow. When the ladder is satisfactorily adjusted, the winches are made to take up on the bow and quarter lines on one side of the dredge, thus pulling the whole dredge in that direction. By continuing this motion gradually, the other side of the river is reached. The ladder is then again lowered. The average distance over which the ladder is lowered to start a new cut is 6 in., but it will readily be understood that this depends on the nature of the ground being worked, and the requisite adjustment of the ladder is only determined by observation of the amount of gravel coming up in the buckets.

The winches are then made to take up on the bow and quarter lines on the other side, and the return is gradually made toward the opposite side of the river. These operations are repeated until the buckets strike the bed-rock. The ladder is then raised high enough to clear all ground, and a few feet are taken up on the head line, this distance also depending on the nature of the ground, and varying from 1 ft. to 5 ft. All the operations previously described are repeated, and so the work goes on.

Average Initial Cost and Possible Profits.—The total cost of a modern gold-dredge is, on an average, $50,000. The profits derived from its operation of necessity vary very considerably. Like almost every gold-winning project, gold-dredging is a speculative enterprise. Some dredges have failed to pay their working expenses, while others are constantly making a handsome profit. In ground of only a fairly high standard of gold productiveness, however, an average of 30 oz. a week is often maintained. The working expenses, including all salaries, repairs, etc., may be taken at $200 a week, so that, estimating the value of the weekly haul at $600, the resulting profit is $400 a week, or $20,800 per annum, which represents a yearly income of 40 per cent on the original outlay. These satisfactory profits are, however, I am bound to confess, rather the exception than the rule.

In conclusion, I wish it to be distinctly understood that the dimensions of individual parts of machinery, and, in fact, practically all of the figures I have given, are necessarily merely arbitrary, and are widely varied to suit different working conditions.

A NEW DISCOVERY OF COAL IN RUSSIA.—According to a recent press report a new coal-field has been found in the government of Plotsk, Russian Poland. The locality is near Ripine, and the beds that have been explored have a thickness of about 10 m., occurring 100 m. below the surface.

THE LAKE SUPERIOR IRON REGION.

BY OUR SPECIAL CORRESPONDENT.

Estimating all-rail shipments at 450,000 tons, and including ore from the Michipicoton range in Canada, the shipments from the Lake Superior mines in 1903 reached a total of 24,300,607 tons; which compares with 27,869,542 tons in 1902; 20,824,569 tons in 1901; and 19,123,528 tons in 1900. The details of the shipments for 1903 were given in our issue for January 7.

Shipments by ranges for the past two years have been as follows, including rail shipments, and also those from the Michipicoton mines in Canada; the figures are in long tons:

Range.	1902.	1903.	Changes.
Mesabi	13,342,840	12,828,964	D. 513,876
Menominee	4,627,524	3,651,266	D. 976,258
Marquette	3,853,010	3,114,396	D. 738,614
Gogebic	3,663,484	2,828,180	D. 835,304
Vermilion	2,084,263	1,676,744	D. 407,519
Michipicoton	298,421	201,057	D. 97,364
Total	27,869,542	24,300,607	D. 3,568,935

The total shipments of the several ranges since their opening have been as follows:

Range.	When opened.	Total shipments.	Per cent.
Marquette	1850	69,800,898	28.6
Mesabi	1893	66,576,771	27.2
Menominee	1877	45,918,499	18.8
Gogebic	1884	40,646,454	16.6
Vermilion	1884	20,738,250	8.5
Michipicoton	1900	794,645	0.3
Total		244,475,517	100.0

These totals vary from some given on account of the fact that the shipments from the Michipicoton range have been included therein. The enormous total shows the great importance of the region to the iron industry of the country.

While these figures show a marked diminution from the preceding twelve months, the ratio of growth for the decade is about as had been expected, and the increase for two years is at the rate of about 10 per cent a year. It is scarcely possible, however, that any such ratio can be maintained the coming year or two. It is doubtful, indeed, if the shipments of 1904 equal those of the year just closed. This may not be due to dull business among the steel-workers for the coming season, but to the fact that ore enough has been delivered forward, and now lies at lower lake docks, furnace stock-piles and at upper lake points of distribution, in such quantity that it will take a year of fairly good business to absorb it, and that, until it is drawn down to reasonable limits, there will be no great activity among mines.

The commencement of 1904 is in great contrast to that of the preceding year. Then there had been the greatest shipment ever known, consumption was outrunning production in finished material more than in ore, but was immense in both. There was no thought that in one year the country that was importing foreign steel should be eagerly seeking an outlet abroad for a mass of product the home market refused to digest, even at reduced price. When the Bessemer Ore Association met in the early days of 1903, in order to fix its prices for the year, there was no protest against the determination to make an advance on all ores. This was done, and prices for the year were put at from 25 to 75c. higher than had ruled for some time. But the balance of values had not been properly maintained, and immediately some ores were more in demand than others. The cheaper ores, Mesabis, and especially Mesabi non-bessemers that were quite close to the bessemer

limit, were found by furnacemen to be at a price that permitted a material saving, if a small amount of high-grade bessemers could be used as a mix. This fact governed sales of the early season.

Shipments were well maintained until the latter part of the year. At last the changed conditions, that had been so manifest in the East, became evident in the mining regions also. There was a sudden and sharp curtailment. It was noticeable all along the line, from the exploration for new ore properties, and their purchase by steel-making interests, to the very movement of shipping on the great lakes, and to the demand for new tonnage to carry the ore of later years.

One of the notable features of the recent years of sharp activity in iron and steel, and of the conditions arising from the formation of the United States Steel Corporation and its overwhelming ore supplies, was the increasing inquiry for ore properties in the lake region by outside and independent steel-makers. They had begun to realize, what had been pointed out year after year in this correspondence, that to control ore was the prime necessity to continuance in the steel trade. So they were all after ore, but the best and largest properties seemed to be gone.

Constantly ascending prices were paid for mines of less and less value, until, early in 1903, the bars seemed to have been let down to a grade of ore that a year or two before would not have been considered merchantable. It was necessary, apparently, for there was nothing else to be had. Nothing else, excepting in rare instances, was being found. The smaller steel-makers, many of them, at any rate, were not provided with ores, and must be content to take what was in the market, and at such prices as sellers considered proper. This condition of things, utopian for the exporers and mine-owners, did not last. A blight as sudden as a plague came upon trade, and there were no more negotiations under way. So things have remained since. It is impossible for this condition to continue long; ore is as necessary to the steel-maker as it has ever been, more so as the reserves of the giant corporation grow more and more all-embracing. The mine market and the exploring business will revive, and even leaner ores than have yet been considered available will be found useful.

During the year the United States Steel Corporation has maintained and increased its lead as holder of the great majority of tonnage throughout the Lake Superior region. It has bought some properties direct and has added much to its holdings by securing mines belonging to large independent steel-making companies, like the Sharon and Union Steel, that it has absorbed. These have given it large additional holdings of desirable ores, for they were both among the very important outside holders of lake properties. Chief of its purchases was that of the Chemung properties on the Mesabi range, where it secured by direct lease property estimated to contain at least 100,000,000 tons of merchantable ores, and explored to show two-thirds that quantity.

It is such deals as this that show generalship of a high order.

With the cessation of demand for ore, exploration was soon checked, and instead of more than 250 drill crews on the various lake ranges, there are now not to exceed 50, and some of these are in the distant fields about Baraboo, Wis., 200 miles south of the lake district. There has been for the past two or three years a constant interest among iron men in the Menominee range and its possibilities as a field for new finds. It is a very wide and promising formation, with many basins and folds that are alluring, and its possibilities cannot be fully proven for many years. It has not, of late, been especially fruitful in results, but enough new mines have been found to make its continued exploration well worth while. To-day there are not more than four or five drills on the entire Menominee, and exploration by shafts and tunnels is practically stopped. The Menominee is so near a market that its ores can be delivered at Chicago at a price considerably under those of the new Baraboo region, a fact that seems to have escaped general notice.

At two points in the Marquette district, far to the west and south of the productive parts of the range, explorations are going on, and with some encouraging results. Elsewhere drills are idle. Not a drill is working on the Gogebic, except at a point a few miles south of the outcrop of the productive formation, where some appear to think a south range exists. On the Vermilion three drills continue at work into the new year, all upon the famous Section 30, whose exploration began just a year ago.

At Baraboo, the suspension at the original mine immediately after its first shipment of ore reached furnaces is not an encouraging indication, and has had some effect upon neighboring development. It is not known that this suspension was due to disappointment with the quality of ore as it showed by analysis, but such rumors have been rife. Those interested deny their truth.

Since the formation of the United States Steel Corporation, mining men have been permitted to plan their betterments and improvements with an eye further into the future and with a more generous expenditure of money than before. With abundant supplies of cash available at low rates of interest, it has been possible to make more improvements, with a view of lowering per ton costs, than were before advisable. This has resulted in better and larger shafts, more powerful machinery, and an all-round change, leading to the production of a greater tonnage at a lower cost. On every Lake Superior ore-range this change is in progress. Steel is replacing wood as the material for shaft-houses, also for shaft-linings, and fire danger will soon be reduced to a minimum in the more important properties. Machinery of a refinement and economy hitherto unusual is now the rule, and new plants are being designed with a careful attention to results that was not customary in the old days. Greater capacity, the extended use of automatic machinery, safer underground workings, higher speed of operation, and diminished tonnage costs may be regarded as among the ends toward which the chief mining men of the lake district have striven this year, more than ever in the past. On every range, improvements under way are along these lines.

Among systems of mining, that of open-pit work has gained in favor during the year, and for the same reasons and under identical conditions with the change in mining plants. The first cost of stripping is great, but once completed, it saves timbering, men and machinery, and produces ore with a rapidity and at a cost unrivaled in any other system. So stripping is more and more in vogue. The Mesabi has been regarded as the only range in which this system was practicable. Mining officials of the Steel Corporation and other concerns are revising opinions in this regard, and will soon have examples of stripped mines on almost every Lake Superior range. Ideas as to the depth to which it is economical to strip ore-bodies are undergoing revision, and stripping jobs are now contemplated that a year ago would have seemed impossible. With timber advancing steadily in price, until a piece the size of a man's head costs 8 to 10c.; with labor expensive and somewhat uncertain; with the constantly improving machinery for moving masses of material at low cost, the thickness of overburden which can be economically removed from an ore-body of medium size is no fixed quantity. The change in this respect may be considered, perhaps, the most important that has come during the year in mining conditions.

During the year 1902 the total shipments of Lake Superior ores from mines on both sides the lake were 27,869,542 gross tons. Of this, the single large interest mined and shipped 16,025,000 tons, or 57.5 per cent. In the past year this single interest has mined 13,455,035 tons out of an estimated total for the year of 24,300,607, or 55.3 per cent. This slight relative decline might have been expected from the fact that the United States Steel Corporation mined and shipped forward, in 1902, at least 25 per cent more ore than its immediate requirements, in order to maintain a full supply at lower lake points of receipt. Its diminished proportion of the whole was made up by an increased part produced by mining interests affiliated with the new independent steel-making concern at Buffalo, and by other pig iron and steel interests.

In 1902 the proportion of all lake ores shipped by the State of Minnesota rose higher than in any previous year, reaching 55.3 per cent. In 1901, for the first time, it had exceeded half the total shipments. But for 1903 Minnesota's proportion of the whole was up to 59.7 per cent. Michigan and Wisconsin combined, produced, therefore, but about 40 per cent of the output of the Lake Superior region. It was but ten years ago that the Mesabi became a factor of importance, and prior to that time Minnesota had scarcely reached an annual production of 1,000,000 tons from the Vermilion range. The thought rising from this showing is, what would now be the position of the United States as a steel-maker but for the discovery and timely exploitation of the Mesabi range?

In the 53 years since the first 10 tons of Lake Superior iron ore was painfully dragged from Negaunee to the lake and shipped in a little sailboat to bloomeries, there has been produced by these mines the enormous total of 243,884,250 gross tons, an amount far surpassing any possibility of the understanding. More than half this vast quantity has been produced the past seven years; half the rest had been in the six years ending with 1896. It took 27 years from the commencement to get shipments of any single year up to 1,000,000 tons. It took 37 years to make the sum aggregate 30,000,000 tons. Is this constant-acceleration of pace, broken only by an occasional untoward year like that just past, to be maintained, and if so, then how, and from what mines? Where is the district, so convenient to cheap transportation, so easily reached, and with ores so accessible and cheaply mined, so pure and kindly in the furnace, that can furnish this total for an indefinite period of the future?

It has not yet been found, and iron-masters have not been remiss in their search for it. The Mesabi is the nearest, but no Mesabi can forever stand the strain of an annual production such as is sure to be called for.

The old ranges maintain their reserves wonderfully; to-day they contain more ore in sight than at any previous period of their existence. But they have not increased production of late, and probably cannot do so, without more rapid depletion of reserves than owners consider safe. Last year, all but the Marquette increased much above previous maximums; that range was not able to surpass the production of 1899 by more than 2.5 per cent. This year the universal diminution, coupled with the added share of the Mesabi, permitted all to drop back materially. But is the Mesabi able to shoulder the load? Its ore reserves are enormous, far greater than is generally supposed, but they are closely held, and are of little benefit to the independent producer, who is not supplied with mines. Recent furnace experiments by one of the leading Mesabi interests indicate that much of what now seems poor material can be utilized to advantage in the furnace, and it is probable that the percentage of iron in what will be classed as merchantable ores will be gradually lowered, even as it has been of late. By this means hundreds of millions of tons of ore will be brought into the market, both on the Mesabi and other lake ranges. The quantities of lean silicious ores, many of them bessemers, to be found on the south shore of Lake Superior, run to vast totals. That all these will be valuable in a short time, there can be no doubt. Many leading interests have already perceived this, and are securing these ores in quantity.

The search for ore in extensions of the Lake Superior fields on both sides of the international line, during the past year, has been disappointing. Results have been exceedingly small. Canada has not shown the ore concentrations its vast formations promised. No exploration is under way in that vast field, and none is likely for some time. There are ore-deposits on the Canadian side, but none of value have been found in recent years.

The present year enters with docks at all lower lake ports choked with ore, and with furnaces so well supplied that they are taking it from docks with annoying delay. Mines are well filled with stocked ore; great open pits on the Mesabi are in readiness to turn out an unknown quantity of ore at a moment's notice; railroads and ships have a capacity never yet fully tested; and with it all there is no great demand from consumers. That the year will be slower at mines than the last, there is no doubt.

HYDRO-ECONOMIC INVESTIGATIONS IN PENNSYLVANIA.—The hydro-economic work of the United States Geological Survey in Pennsylvania is in charge of W. H. Dean, who is at present engaged in examining the waters of the Lackawanna and Susquehanna rivers, in the upper coal measures of Pennsylvania. Mr. Dean's report of analyses shows clearly the effect of acid mine drainage upon the waters of these two streams and upon the sewage matter which is turned into the rivers from the cities of Scranton and Wilkes-Barre. The results of these investigations will be given in the progress report for the year 1903.

LEADVILLE MINES IN 1903.

BY OUR SPECIAL CORRESPONDENT.

Leadville has felt the labor troubles of the year less than any other camp in the State, owing to the firm stand taken by local men when trouble was brewing, and the mines of the Leadville district have done remarkably well, the tonnage for 1903 being some 850,000 tons of all classes of ores, valued at about $9,350,000. This makes the total valuation of the output of the Leadville district to date, $305,204,214, of which all but $20,000,000 has been produced since 1879.

The valuation of the district's output during the past year shows 64,145 oz. gold, 4,954,466 oz. silver, 45,666,058 lb. lead, 2,618,154 lb. copper, 58,356,000 lb. spelter, and 3,836 tons of manganese, making a total in round figures of $9,373,000. The statements of the various mine managers show that the ore was as follows: 49,434 tons carbonate, 208,779 tons oxidized, 284,396 tons sulphides, 80,213 tons zinc, 99,884 tons silicious and 3,836 tons manganese. The zinc shipped to outside smelters amounted to a little over 58,356,000 pounds.

The heaviest producers of the district and their 1903 records are as follows: Iron Silver Mining Company, 3,177 tons carbonate, 48,030 tons sulphide and 65,713 tons zinc; New Leadville Home Mining Company, 30,000 tons oxidized iron; Ibex Mining Company, 16,498 tons carbonate and 26,116 tons sulphide; Sixth Street, 22,000 tons oxidized iron; Penn Mining Company, 18,000 tons silicious; Caribou, 32,146 tons oxidized, 2,322 carbonate; New Monarch Mining Company, 8,000 tons sulphides and 14,000 tons silicious; Midas Mining Company, 59,313 tons oxidized iron and 1,830 tons carbonate; Western Mining Company, 61,000 tons sulphide; A. Y. & Minnie, 41,600 tons sulphides; Fryer Hill Mines Company, 20,000 tons sulphides; Yak Mining, Milling & Tunnel Company, 22,740 tons sulphide and 1,260 tons zinc; Resurrection Mining Company, 22,600 tons sulphide; Forest City and Result mines, 2,709 tons oxidized iron, 4,950 tons carbonate, and 2,238 tons sulphide; Morning Star Company, 12,000 tons oxidized iron; Evening Star, 4,000 tons oxidized iron; Lillian, 1,200 tons silicious; Benton Company, 2,000 tons silicious; Bon Air, 11,200 tons oxidized iron; Diamond Mining Company, 13,530 tons carbonate; R. A. M. (Small Hopes lease), 338 tons carbonate, 18,035 tons sulphide and 3,740 tons zinc; Yankee Doodle, 8,086 oxidized iron; Boreel, 4,276 tons of sulphides. A large number of smaller producers under lease show a production of from 300 to 800 tons of various metals for the year.

During the year the continuity of Leadville ore-shoots into unexplored ground at greater depth was proved, and the diamond drill has shown that ore-deposits exist of greater extent than those heretofore explored. One of the greatest achievements of the year was the opening of the Iron Silver Mining Company's shoots through the Moyer workings, proving a system of iron deposits for hundreds of feet in all directions, and making that company one of the greatest producers of the Leadville district to-day; and also proving that this iron shoot extends across the hill, possibly into an immense acreage of virgin ground. Another important event was the combination of the Coronado, the Midas and other territory under one head, the connection of these properties, and the proving of mineralization below with diamond drills.

The completion of the Yak tunnel to No. 4 shaft of the Ibex, opening up this gold-belt property at a greater depth than ever before attempted; the sinking of a new 500-ft. shaft by the Campions on the Wells-Moyer placer, to open up the Rock and Dome shoot west of the fault; the starting up of drill prospecting on large placer acreage just south of the city; the opening up of a great ore-shoot, after the expenditure of $200,000, in the Diamond; the large tonnage and splendid advancement made by the Fryer Hill Mines Company; the success of the concentrating mills on the Wolftone, Minnie and Resurrection properties; and the 300-ton sulphide mill at the Arkansas Valley smelter, are among the important happenings of the year.

The Leadville Basin has made great progress through the Midas-Coronado-Northern combination, effected early in the year. The most important work has been the sinking of drill-holes below the present 660-ft. workings, showing deposits that will require probably $150,000 to $200,000 to open. The Leadville Home Mining Company has worked steadily and made a large low-grade iron tonnage, while various drill-holes have demonstrated new deposits. The Bon Air and the Starr, under direction of Mr. Schlessinger, have been put among the producers of lead and iron ores. In the Caribou, Manager George Campion has proved an immense iron body, with the diamond drill, below the present workings.

On Carbonate Hill there has been but little new work. The Western Mining Company's territory, embracing the Wolftone, the Maid, the Adams and the A. Y. & Minnie, under the direction of Messrs. Nicholson & Rodman, has made an immense tonnage. The Small Hopes people did considerable work early in the year with their big sulphide bodies, but at present a few lessees are working the lead-carbonate levels of several of the shafts. The great Greenback bodies of iron sulphides have not been worked, the company not being able to agree with the smelters.

On Fryer Hill the real work of the year is that of the Fryer Hill Mines Company, which, under direction of Manager Newell, has made a heavy tonnage of low-grade ore, and has a new shaft nearing completion on the Pride of the West. It has proved one of the greatest prospecting enterprises ever started here.

On Iron Hill, through its Moyer workings, the Iron Silver Mining Company has opened a remarkable iron shoot that is producing thousands of tons and growing larger as developed. The company paid good dividends during the year, and spent a large sum opening the mine. The Belgian-Frenchman Company has been formed to operate the Louisville combination, and, altogether, Iron Hill is more active than in years. On Rock Hill the sale of the La Plata mines to eastern men is considered important. The new shaft of the Reindeer Company, now completed at 500 ft., will reopen the old Rock and Dome shoots west of the fault for the first time. The Yak tunnel, which has its mouth in California gulch, is now some 11,000 ft. long. The company has been a heavy producer during the year.

In the Gold Belt, the main features of the year are the successful work of the magnetic concentration mill at the Resurrection, enabling the company to handle large bodies of low-grade ores; the preparations of the New Monarch Company to ship heavily to the Salida smelter and to sink the New Monarch

shaft to 2,000 ft.; and the successful opening of a large body of low-grade ore in the Diamond, after $200,000 spent in prospecting. The Ibex made a heavy tonnage of oxidized and silicious material, and its No. 4 shaft now connects with the Yak tunnel at a depth of 1,300 feet.

The completion of the Bartlett 1,200-ft. tunnel on Sugar Loaf is the most important piece of new work in outlying sections. Some big deals are just closed in the Twin Lakes section. The prospecting work of the Bug Gold and the Little Louise companies, in English gulch, has been satisfactory. The Horseshoe section has opened some rich lead ore.

The zinc production has made great gains, due to the success of the processes introduced. The Resurrection, the A. M. W. and the Minnie mills are the principal concentrators.

The Arkansas Valley smelters, of the American Smelting & Refining Company, built a mill that handles 300 tons of low-grade sulphides daily. The Ohio & Colorado Smelting & Refining Company, at Salida, reports a very successful year. It has built 12 new roasters to handle the lower-grade material, and will add more lead furnaces. It also purchased the Republic plant. Altogether, the outlook for the new year is most auspicious.

THE AMERICAN IRON & STEEL ASSOCIATION.

In the current issue of the *Bulletin* of this association announcement is made of the election of Joseph Wharton as president of the American Iron & Steel Association. The *Bulletin* refers to the death in the past year of President B. F. Jones, Vice-President Abram S. Hewitt and Treasurer Andrew Wheeler. The article continues:

"The vacancy caused by the death of Mr. Jones has been filled by the promotion of First Vice-President Joseph Wharton, this selection having been indicated by correspondence with many representative manufacturers as their choice for the position. It has not been thought necessary to call a meeting of our members to formally ratify this choice. In addition to his manifest fitness for the presidency of the association, Mr. Wharton's long incumbency of the office of first vice-president naturally indicated his selection as Mr. Jones' successor. Mr. Wharton is well known to our old members. He was identified with the Bethlehem Iron Company during its whole life, and with its successor, the Bethlehem Steel Company, until the recent sale of its plant. He is now a manufacturer of pig iron at four modern furnaces in New Jersey, and is a stockholder and director in the Seaboard Steel Casting Company, at Chester, Pa. His incumbency of the office of president may be regarded as dating from January 1, 1904.

"The office force of the association now consists of seven persons, the result of a steady growth in the business of the office since the days when three persons did all its work. Mr. William G. Gray, with three assistants, is in direct charge of our statistical division, as in recent years.

"The American Iron Association was organized in Philadelphia on the 6th day of March, 1855. In 1864 the association was reorganized and its name was enlarged to the American Iron & Steel Association. From 1864 to 1904 the association has had only five presidents, including Mr. Wharton, who had served as first vice-president since 1875. Still another vice-president, William Metcalf, has served since 1884. In the same period of nearly 40 years the association has had only three treasurers, Charles Wheeler serving from 1864 to 1883 and Andrew Wheeler from 1883 to November, 1903, when he was succeeded by his son, Andrew Wheeler, Jr. In its whole history the association has had only four secretaries.

"The first president of the American Iron & Steel Association was Captain E. B. Ward, elected at the reorganization in 1864, who resigned in 1869, when he was succeeded by Samuel J. Reeves, who had been vice-president since 1864. Mr. Reeves served as president until his death in December, 1878. In March, 1879, Hon. Daniel J. Morrell was elected president, serving until December, 1884, when he resigned owing to ill-health. In January, 1885, Hon. B. F. Jones was elected president, and served until his death in May, 1903."

WAGES IN THE LAKE SUPERIOR IRON REGION.

Wages of iron miners were generally reduced January 1, 1904, throughout the Lake Superior region, the reduction being about 5 per cent in the case of unskilled men and 10 per cent in the case of miners, the former now receiving $1.50 per day and the latter $1.80@$2.20. The Pewabic Mining Company is paying miners $2.20. The Oliver Mining Company (United States Steel Corporation) has made the following scale in the Crystal Falls District: Miners, $1.80@$2.00; helpers, $1.80; skip-tenders, $1.60; pumpmen, $1.80; trammers, $1.60; shift bosses, $2.10. On the surface, enginemen receive $1.80; stokers, $1.75; machinists, $2.00; smiths, $2.10; helpers, $1.60; carpenters, $2.00; common laborers, $1.50 per day.

ABSTRACTS OF OFFICIAL REPORTS.

Champion Reef Gold Mining Company.

This company owns and works an important mining property in the Kolar gold-field in Mysore, India. Its report is for the year ending September 30, 1903. The capital stock is 520,000 shares, of 10s. par value, or £260,000.

The directors' report says: "The profit exceeded that of the previous year by £153,049, and amounted to £441,341, to which £697, the balance remaining after paying the final dividend for the previous year has been added, making a total of £442,038 at credit of profit and loss account. Out of this sum, two interim dividends of 4s. 6d. and 5s. 6d. per share respectively, amounting to £236,500, have been paid, and appropriations have been made as follows: Income tax, £14,187; depreciation of machinery, plant, etc., £9,320; part of expenditure on Tennant's shaft, £5,000; and sundry items, including the vote of £5,000 at the last general meeting, £7,107. There remains a balance of profit amounting to £169,924, of which the directors recommend that the sum of £168,331 16s. be applied to the payment of a final dividend for the year of 6s. 6d. per share on 513,832 fully-paid shares and 4s. 4d. per share on 6,168 partly-paid shares, leaving £1,592 to be carried forward.

"The total sum distributed for the year will then amount to £404,832, being 16s. 6d. per share on the old shares, 6s. 6d. per share on the fully-paid new shares, and 4s. 4d. per share on the partly-paid new shares. On the old shares the amount paid will be equal to 165 per cent, as against 105 per cent last year.

"During the 12 months under review 173,629 tons of ore have been crushed in the mills, which shows an increase of 39,541 tons upon the preceding year's total, while the quantity of tailings subjected to the cyanide process has been more than doubled, 246,300 tons having been treated as against 115,411 tons in the previous year. The production of gold has also been largely increased, both from the quartz and the tailings, in consequence of the greater tonnage dealt with; 174,115 oz. bar gold were extracted in the mills and 32,335 oz. were recovered from the tailings. The total weight of bar gold produced, therefore, amounted to 206,450 oz., which was sold for £782,757, and exceeded last year's results by 55,705 oz. and £211,052. The yield in bar gold per ton of quartz stamped averaged 19 dwt. 21 gr., and per ton of tailings treated by the cyanide process 2 dwt. 15 gr., as compared with 20 dwt. 17 gr. and 2 dwt. 1 gr., respectively, in the previous year.

"The expenditure on capital account during the 12 months amounted to £63,422, and included the outlay on Tennant's shaft, £14,166, Empress water shaft, £2,981, buildings, machinery and plant, £25,235, furniture and sundries, £287; Benhope property, £752, and the payment to the Gold Fields of Mysore Company, £20,000. The principal addition to the machinery was a pair of powerful air-compressing engines. These engines have been running for the past five months and have provided power for operating 45 to 50 additional rock drills. The new plant includes, among other necessary works, a poppet-head and ore-bins at Glen shaft, Otto ropeway from No. 1 mill to the cyanide works, and extensions of the tramways at surface.

"The working expenses again show a substantial reduction in the costs per ton in the three principal departments of mining, milling and tailings treatment, due, in a great measure to the advantage attendant upon dealing with largely increased quantities of quartz and tailings, and also to economies effected in various directions.

"For the purpose of acquiring additional mining rights and for carrying out important new works, the capital of the company has been increased to £260,000 by the creation of 47,000 additional shares of 10s. each, in accordance with resolutions passed by the shareholders. Ten thousand of these new shares were set aside for allotment to the Gold Fields of Mysore and General Exploration Company, Ltd., in part payment for the mining rights purchased from them, and the remaining 37,000 shares were offered to the shareholders at a premium of £5 10s. per share. At the date of the balance sheet, 33,574 new shares had been allotted, and since then the remaining 13,426 shares, which include the 10,000 shares payable to the Gold Fields of Mysore Company, have been issued. The transfer of the new property has been effected, and the total area now possessed by the company comprises 495 acres. The amount of £148,500, premiums received on the 1901 issue of shares, has been applied to the reduction of the following accounts: £75,000 written off mining rights and leases, £30,000 off buildings, machinery and plant, £1,500 off furniture and sundries, and £42,000 off cost of shafts. It will be seen that the balance sheet discloses a strong financial

position which will facilitate the important undertakings in contemplation, such as the sinking of the new deep vertical shaft, the extension of Tennant's shaft, and the improvements to Garland's shaft, necessary for the future effective working of the mine at greater depths.

"The report of the acting superintendent contains a complete description of the work accomplished during the year, both in the mine and at surface. With the additions to the air-compressing plant, it was possible to work a larger number of rock-drills, and a greater extent of ground was opened up than in any former year, as follows: Sinking shafts and winzes, 5,220 ft.; driving levels and crosscuts, 12,147 ft.; rising, 2,504 ft.; total, 19,871 ft., which compares with 17,495 ft. in the preceding 12 months. These developments have revealed a continuance of highly auriferous ore in the deeper workings throughout the mine, and in places massive bodies of quartz are exposed. A distinct improvement is noticeable in Garland's section, the western portion of the lode there furnishing a valuable addition to the reserves. A striking feature is the fact that the 1,740 and 1,840-ft. main levels from Ribblesdale's shaft, in conjunction with levels from the other shafts, traverse the whole length of the property from north to south, a distance of 3,440 ft., and that the 1,840 ft. level is in a productive lode throughout. At the same time the drivages on the branches of the lode practically increase the length of these workings by several hundred feet. In the three levels below the 1,840-ft. level, and in the shaft itself, the lode is consistently of high value. Tennant's (vertical) shaft intersected the lode at a depth of 1,698 ft., and after passing through the lode sinking was continued with a view to cross-cutting west at the 1,809-ft. level, to communicate with the 2,040-ft. level from Ribblesdale's shaft. Considerable progress has been made with the preparations for extending this shaft on the incline of the lode. The reserves of ore have been greatly increased, notwithstanding that 173,629 tons have been extracted and milled, and they are now estimated, according to the acting superintendent's report, at 366,000 tons, or 121,000 tons more than a year previously.

"A good rainfall followed upon last year's drought, and a sufficient supply of water has been available for running the whole of the machinery without hindrance. During the past three months the rain has been excessive, and the dam, in course of construction at Bethamangalam by the Mysore Government in connection with the new water scheme, broke down, thereby delaying the completion of the work. All the machinery on the mine has been maintained in excellent order, and the useful and efficient work carried out in the molding and boilermakers' shops has effected both economy and saving of time. The electric motors have run well, and, in accordance with the agreement with the government, were taken over by the company on August 6 last. Preparations are being made by the Mysore Government, in accordance with the Cauvery electrical scheme, for the development of a further amount of power, which it is anticipated will be available next September. Out of this new supply the company will take approximately 800 h. p. A company, called the Kolar Mines Power Station, Ltd., has been formed, with a capital of £30,000 in shares of £1 each, for the purpose of laying down on the field an electrical plant, from which the mines will obtain motive power for driving certain of their machinery at a lower cost than by steam.

"The whole of the capital is subscribed by the five principal companies on the Kolar goldfield, who will have the exclusive use of the power in proportion to the number of shares taken by each. This company has subscribed for 11,340 shares in the Power Company, and will have the right to use 378 h. p. A portion of the plant has already been shipped, and it is expected that the power will be available next September.

"An option has been acquired by this company on a property named Benhope, situated near Coonoor, Madras Presidency. Mr. Arthur Gifford, of the Mysore Company, examined the property and discovered outcrops of quartz in several places. Assays of samples taken by him from the outcrops showed gold contents from a trace up to 10 dwt. 10 gr. per ton. An agreement has been entered into for an option over 76.16 acres on the following terms: this company shall at its own expense conduct such work for proving the property as it thinks fit, and may exercise the option of purchase any time within three years from the commencement of operations; on forming a separate company to take over the property, one-fifth of the purchase price is to be paid to the owner, this company retaining four-fifths; the company is at liberty to abandon operations at any time. An engineer has been placed in charge of the operations for opening up the reef and he started the work last August. According to the latest reports, three adits have been driven in the lode formation 28, 46, and 19.5 ft., respectively, and samples taken in course of driving assayed from 16 gr. to 6 dwt. 12 gr. of gold per ton, the width of the reef being from 2 to 3 ft.

"The health of the employees has been, on the whole, fairly good, and the measures taken by the medical staff and superintendents of the mines, with the co-operation of the Mysore Government, have been successful in preventing any serious epidemic."

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail price? These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Tasmania. Report on Sandfly Coal Mines. By W. H. Twelvetrees. Hobart, Tasmania; Public Printer. Pamphlet, 12 pages.

A Manual of Mechanical Drawing. By Philip D. Johnston. New York; the David Williams Company. Pages, 148; with 69 plates. Price, $2.

Annuaire pour l'An, 1904. Compiled by the Bureau des Longitudes. Paris, France; Gauthier-Villars. Pages, 848. Price (in New York), 50 cents.

Annual Report of the Mine Inspector for Allegany and Garrett Counties in Maryland. James P. Carroll, Mine Inspector. Midland, Md.; published for the State. Pages, 44.

The Record of the Boston News Bureau on Amalgamated. Some Comparisons with United States Steel. Boston, Mass.; The Boston *News Bureau.* Pamphlet, 36 pages.

Tasmania. Report on Mineral Fields Between Waratah and Longplains. By W. H. Twelvetrees. Hobart, Tasmania; Government Printer. Pamphlet, 38 pages; with map.

Ninth Annual Report of the Boston Transit Commission, 1903. Howard A Carson, Chief Engineer. Boston, Mass.; published by the city. Pages, 96; with maps and illustrations.

Foundry Nomenclature. The Moulder's Pocket Dictionary. Compiled by John F. Buchanan. London; E. & F. N. Spon, Ltd. New York; Spon & Chamberlain. Pages, 232; illustrated. Price, $2.

The Polar Planimeter and Its Use in Engineering Calculations, Together with Tables, Diagrams and Factors. By J. Y. Wheatley. New York; The Keuffel & Esser Company. Pages, 114; with diagrams and tables.

The Kerosene Shale Deposits of New South Wales. By J. E. Carne. Prepared under supervision of the Geological Survey. Sydney, N. S. W.; Government Printer. Pages, 336; with maps, plates and sections.

United States Geological Survey. Mineral Resources of the United States. The Production of Monazite in 1902. By Joseph Hyde Pratt. Pages, 8. *The Production of Gypsum in* 1902. By George I. Adams. Pages, 16. *The Production of Mineral Waters in* 1902. Pages, 36. *The Production of Cement in* 1902, *with a Review of the Cement Industry in the United States.* By L. L. Kimball. Pages, 50. *The Manufacture of Coke in* 1902. By Edward W. Parker. Pages, 72. Washington; Government Printing Office.

BOOKS REVIEWED.

British Columbia. Annual Report of the Minister of Mines for 1902. William Fleet Robertson, Provincial Mineralogist, Victoria, B. C. Pages, 320; illustrated.

The present volume of this valuable report summarizes the progress of the mining industry in British Columbia during 1902. It contains numerous statistical tables showing in detail the production of minerals and metals in the last few years and also a complete review of recent developments in the several mining districts of the province. The steadily increasing importance of the mining industry fully justifies the great expediture of efforts, on the part of the government, which is represented in the publication of this report.

The Analytical Chemistry of Uranium. By Harry Brearley. London, 1903; Longmans, Green & Company. Pages, 39. Price (in New York), $0.75.

This little book embodies the results obtained by the author in the chemical investigation of uranium, more particularly in the commercial analysis and separation of the metal. It is practical in its treatment of the subject and gives a good deal of information that will not be found in the larger chemical text-books. As the subject of uranium has recently come into special prominence, owing to its association with radium, the book does not lack the feature of timeliness.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.

Letters should be addressed to the EDITOR.

We do not hold ourselves responsible for the opinions expressed by correspondents.

Nova Scotia Gold Mines.

Sir.—In a short article in a late issue of your JOURNAL, touching gold mining conditions in Nova Scotia, you state that the veins outcropping at the surface are exhausted, or nearly so. This statement is somewhat misleading. There are enough gold-bearing veins outcropping on the surface in one certain district to keep 100 stamps running night and day for 40 years. There are several such districts in the province of Nova Scotia.

ALEXANDER MCLEOD.

Liscomb Mills, N. S., Jan. 6, 1904.

Indexing Current Information.

Sir.—Since subscribing to THE ENGINEERING AND MINING JOURNAL some years ago, I have endeavored to keep its pages at hand for reference at all times. This I have partially accomplished by having the volumes bound in regular book form, and then making use of the index for the purpose of ascertaining such matter as may have been published on such point, appliance, district, etc., concerning which, at the moment, I may be interested. At best, however, this is a rather unsatisfactory method, in that time and patience is often lost in tracing up such information through several rather bulky volumes, and it must be that some one of the JOURNAL's readers, if not indeed many, has devised a scheme which, while comprehensive, is also compact, and permits of all information on any one point, mining district, machinery and what-not, being readily referred to when occasion requires. I have partially formulated such a scheme in my own mind, but should prefer acquiring a few pointers from those readers of the JOURNAL who can aid me from personal experience. To you and to them I will acknowledge my indebtedness. R. J. WELSH.

San Antonio, Texas, Dec. 26, 1903.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

PROOF OF NEGLIGENCE OF MINE OPERATOR.—In an action to recover for the death of a mine employee killed by the caving in of a mine, in which there is no question of contributory negligence of a fellow servant, but the right to recover depends solely on the negligence of the employer, the burden of proof on such issue is on the party bringing suit, and the fact of the cave-in itself carries no presumption of such negligence.—Mountain Copper Company v. Van Buren (123 *Federal Reporter*, 61); United States Circuit Court of Appeals.

PARTIES CANNOT DEFEAT RIGHT OF CONTRACT BY OWN ACT.—A party contracted to sell another a mining claim, identified in the contract by name and by reference to the government survey, and to a deed which he had made and deposited in escrow. At this time he had made an application for a patent, which was pending, and which he agreed to prosecute to a determination, and the purchase money was to be paid on the delivery of the deed and the final receipt of the receiver of the Land Office. He obtained his receipt and tendered and demanded performance within the time limited in the contract, and in accordance with its terms, which the other refused. At the time this contract had been made the other party was the owner of another claim, for which he had applied for a patent, and which was prior in location to the one contracted for and overlapped same; such fact being known to both parties at time of contract, both claims have been previously surveyed and marked on the ground. Subsequently the second party, having obtained his patent, filed a protest against the granting of a patent to the first party for that portion embraced in the patent of the purchaser, and this was sustained. The court held that the parties must be presumed to have contracted with reference to the facts which they knew to exist, and that the seller had fully complied with his contract when he obtained and tendered the receipt, and his right to recover the purchase money could not afterward be defeated by the protest.—Griffin v. American Gold Mining Company (123 *Federal Reporter*, 283); United States Circuit Court of Appeals.

PEAT IN SWEDEN.—A peat manufacturing works is to be built at Markaryd, in Sweden, where the promoters have acquired extensive tracts of peat bogs. The system to be adopted is the Ziegler process, by which by-products can be saved.

PATENTS RELATING TO MINING AND METALLURGY.

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending December 29, 1903.

747,951. SAFETY DEVICE FOR MINE-SHAFTS.—Norval W. Dickerson, Derwent, Ohio. The combination of an elevator-shaft, a landing provided with rails, an elevator-car movable in the shaft, and provided with rails arranged to register with those of the landing, a horizontally-movable catch pivoted at its rear end alongside one of the rails on the landing, and having an upwardly-extending forward portion, means for normally holding the catch so that its upwardly-extending portion rests in the path of a car on the landing-rails, a rock-shaft journaled in a wall of the elevator-shaft, and having arms at its ends; one of said arms being arranged to be engaged by the elevator, a longitudinally disposed lever fulcrumed at an intermediate point of its length on the landing, a bar connecting the other arm of the rock-shaft and the forward arm of the lever, and a bar connecting the said lever and the catch.

747,965. GAS-PRODUCER.—Jerome R. George, Worcester, Mass., assignor to Morgan Construction Company, Worcester, Mass. In the feeding mechanism of a gas-producer, the combination with a stationary coal-reservoir having an opening in its bottom, of a stationary plate held concentrically above said opening, but of less diameter than the opening, whereby an annular space is left around said plate for the passage of coal, a rotating coal-distributor provided with a horizontal bottom extending beneath said plate, bent, fixed ribs on the under side of said plate and oppositely-bent, rotating ribs carried by said coal-distributor, whereby the coal is moved from said horizontal bottom.

748,019. MANUFACTURE OF ARTIFICIAL ASPHALT STONE, ETC.—Carl Rubitschung, Frankfort-on-the-Main, Germany. A process for the production of a substance for use in the manufacture of artificial asphalt, stone and the like, consisting in separately heating tar and divided stony material, mixing the same, powerfully cooling the mixture before congelation and then converting same into a dry transportable granular mass.

748,061. PROCESS OF CASTING.—Herbert H. Franklin, Syracuse, N. Y. A process of casting with a sectional mould, the same consisting in supplying to the mould the material to be cast and in removing the air from the mould through a narrow space formed by separating contiguous surfaces of sections of the mould during the entrance of the material to be cast, said space being too narrow to permit the escape of the material to be cast.

748,107. APPARATUS FOR DETECTING THE TEMPERATURE OF METALS.—Albert Sauveur, Cambridge, and Jasper Whiting, Lexington, Mass. The combination, with mechanism for working hot metal, of a magnet, and means to indicate the response or non-response of the metal to the magnetic influence.

748,141. CEMENT SHINGLE.—George C. Zwerk, Saginaw, Mich. A tapered shingle of plastic material moulded upon a wire reinforcing-frame, said frame being formed with loops projecting from the thin upper edge of the shingle and adapted to receive nails for securing the shingle to the roof.

748,153. OIL-WELL SWIVEL-WRENCH.—Josiah Barrett, Bellevue, Pa. The combination with a frame or lever, a ring mounted thereon, but in a different horizontal plane and arranged to swing with reference thereto and having an open portion, a rotary tool-holder swiveled in said ring and having an open portion and a seat to receive the tool to be handled, and an outwardly-projecting handle or handles connected to said tool-holders.

748,217. APPARATUS FOR DISSOLVING ORGANIC OR INORGANIC SUBSTANCES.—Charles H. Rider, St. Louis, Mo. A device of the class named, consisting of an acid-tank, a water-tank, an upper series of tanks connected with the acid-tank and the water-tank and to each other, a lower series of tanks adapted to receive the substance to be treated, connected to the upper series of tanks and to the water-tank and to each other; a retort, means for heating the retort, a pipe passing from the retort through the lower series of tanks, and a condenser into which the last-named pipe extends.

748,222. INGOT-TONGS.—Edwin S. Sites, Apollo, Pa. Automatic tongs or ingot-dogs comprising members and pivotally secured together, whereby the lower ends thereof will form a pair of co-operating jaws, each of said members having pivotally connected to its upper end a link-section, the ends of said link-section being pivotally secured together; a clevis-like member pivoted to said link-sections and designed to receive a rope, hook or the like of the lifting-crane, said members also having interlocking arms, a hook-like member mounted in compensating slots provided in the members, and an arm provided with a hook at its lower end adapted to co-operate with the member.

748,270. MATERIAL FOR PROTECTING IRON-WORK AND METHOD OF PREPARING SAME.—William O. Emery, Crawfordsville, Ind. A material for protecting iron or metal work, cables and for similar purposes, consisting of asphalt as a matrix carrying a resisting material, comprising silicates of calcium and sodium and an aluminate of calcium.

743,308. APPARATUS FOR THE REMOVAL OF SULPHURIC ACID FROM WATER.—Hans Reisert, Cologne, Germany. An apparatus for the removal of sulphuric acid from water consisting of a vessel for a barium-carbonate bath, a vessel for the removal of the calcium and magnesium bicarbonates, with filter and water supply pipes.

748,317. LUBRICANT AND PROCESS OF MAKING SAME.—Scott A. Smith, Providence, R. I. A process of treating lubricating-oils, the same consisting in mixing with trioxide of antimony air-slaked lime, then reducing to a powdered form, then adding the finely-divided compound to a heavy-gravity oil and finally adding a lighter-gravity oil.

748,331. COAL-LOADING APPARATUS.—Carl Allison, Pocatello, Idaho. The combination of the track for the supply-car, the inclined ways on opposite sides of and below the track and leading to pits at the lower ends of said guideways, the frames above said pits and provided with guide-rails, the buckets arranged to be lowered in the pits to receive coal

from the guideways, and having at their outer sides hinged doors and at their lower ends pivoted gates provided with pivoted counterweights.

748,350. APPARATUS FOR GALVANIZING METAL SHEETS.—Edward A. Davies, Wolverhampton, England, assignor to Davies Brothers & Co., Limited, Wolverhampton, England. An apparatus for use in galvanizing metal sheets, the combination, with the bath containing the molten galvanizing metal, of a plurality of narrow rings rotative about a common axis and the lower portions of which are immersed in the molten metal, a plurality of rolls opposite and adjacent to the respective rings and having a common axis which is parallel with the axis of said rings and is at the feeding-in side of said rings, and between and by which rings and rolls the sheets to be galvanized are successively carried down into the molten metal.

748,356. FUEL-SAVING BRIQUETTE. — Hermann Eggers, West Hoboken, N. J. A non-combustible fuel-saving briquette, consisting of a dry compacted mixture of clay, sand and a binding medium.

748,361. GAS-PRODUCER SYSTEM. — John W. Gayner, Salem, N. J., assignor to American Producer-Gas Furnace Company. In a gas-producer system, a main conduit, a divided conduit communicating therewith, means for closing one of said divisions relative to the main conduit, and means for removing the soot accumulations from the closed division.

748,371. BUCKET-SUSPENSION DEVICE.—John H. Hayward, New York, N. Y., assignor to the Hayward Company, New York, N. Y. The combination with a two-rope bucket of means operated by the strain upon the ropes to throw the rope which is under strain toward the center line of the bucket.

748,390. COKE-LORRY.—George D. Macdougal, Buffalo, N. Y. In a coke-lorry, the combination of the truck having slideways, the trough open at both ends and having lateral flanges resting upon said slideways, a rack-bar upon one of said flanges, a boxing upon a side bar of said truck and carrying a shaft, a pinion upon the inner end of said shaft and engaging said rack-bar, and a lever-seat at the outer end of said shaft.

748,436. FAN-BLOWER.—John M. Stukes, Dallas, Tex., assignor of one-half to J. T. Elliott, Dallas county, Tex. A fan-blower comprising a suitable shell or casing, a flat-sided rotatable shaft supported therein, throw-off paddles secured to the shaft upon the opposite sides thereof and extending radially in opposite directions to each other and connected to a brace-band, semi-circular angle-blades integral with the throw-off paddles, and a circular rim, the curved edges of the blades corresponding with the curve of the rim and rigidly secured thereto throughout the length of the edges of said blades.

748,447. COMBINED HOISTING AND DUMPING APPARATUS.—William F. Weber, New York, N. Y. A combined hoisting and dumping apparatus, comprising a rotatable structure provided at intervals of its circumference with lateral planes, and buckets or scoops having swinging movement with reference to said planes.

748,456. AMALGAMATING-MACHINE.—Samuel Alford and John J. R. Smythe, Johannesburg, Transvaal, assignors of one-third to Charles Llewellyn Anderson, Johannesburg, Transvaal. An amalgamating-machine, comprising a revoluble pan, and a ring of less height and diameter than the rim of the pan, secured to and inclining upwardly and inwardly from the bottom of the pan.

748,457. APPARATUS FOR CONTINUAL CHARRING AND DRY DISTILLATION OF ORGANIC SUBSTANCES.—Hinrik C. Aminoff, Domnarfvet, Sweden, assignor to Anders Conrad Mark, Gothenburg, Sweden. The combination of an extended, inclined chamber, means for transporting the substance to be charred from the lower end of the chamber to its top end, means for introducing heated gas into the said top end, and outlet openings for the gas at the lower end.

748,461 and 748,462. CHLORINATION-BARREL.—William J. Armbruster, St. Louis, Mo., assignor of one-half to Florence Armbruster, New York, N. Y. A chlorination-barrel having a pulp-chamber, a chlorin-generating compartment located contiguous thereto and in communication therewith, said compartment having a series of sections for retaining apart the reagents intended to generate the chlorine.

748,475. HOLDER FOR MINERS' LAMPS.—James A. Brown, Pocahontas, Va. The combination with a miners' lamp having a hook, of a bracket-plate formed to receive the bow portion of the hook, a transverse latch-bar pivoted on the bracket-plate at one side thereof and adapted to extend across the hook and plate, and means on the plate to hold the latch-bar folded thereover.

748,488. CONTROLLING SYSTEM FOR CONVEYORS.—Arthur C. Eastwood, Cleveland, Ohio. The combination of driving means, a driven member, a current-generator, and means for causing said generator to retard the motion of the driven member only when the driving means is out of action.

748,499. GAS-RETORT.—William E. Hartman, Norfolk, Va. A retort having an upper cellulated wall, through which outer air is circulated, without entrance into the retort or the combustion-chamber of the furnace.

748,517. WELL-DRILLING MACHINE.—Frank R. McKee and Emma E. McKee, Coshocton, Ohio. In well-drilling machinery, the combination of a drive-pulley, a drum for receiving the drill-cable, a brake-shoe, a pulley connected with said drum and adapted to be thrown into contact with either said drive-pulley or the brake-shoe or to an intermediate position, a shaft connected with and receiving motion from the shaft carrying the afore-mentioned drive-pulley, a crank attached to the inner end of the shaft, a pulley having adjustable connection with the said crank and adapted to operate the drill-cable and the tool attached thereto, and a pulley applied to the frame in line with the pulley carried by the said crank to hold the drill-cable in line therewith.

748,518. METHOD OF TREATING AND CLEAVING SLATE.—Watson A. McLaughlin, Delta, Pa. A method of treating and cleaving slate blocks, which consists in submitting the blocks containing water to an artificially-produced temperature below 32° F. for a length of time sufficient to congeal the water contained in the fissures, and then separating the laminæ while the blocks remain congealed.

748,525. PROCESS OF DRYING SULPHATE OF ALUMINUM.—Robert S. Perry and Herman G. Schanche, Philadelphia, Pa. A process of concentrating sulphate of aluminum, which consists in subjecting the material to heat, of such degree that the communicated temperature, under the conditions of evaporation, is slightly lower than the melting-point of the sulphate.

748,528. MECHANISM FOR TREATING ORES.—George M. Rice, Worcester, Mass. A machine comprising a rotatable shaft, supporting-bearings therefor, an operating wheel or pulley fixed on said shaft between the bearings, a heavy-rimmed head-wheel mounted on each end of said shaft, hollow-faced supporters fixed upon the head-wheels and adapted for seating an ore-container cylinder thereon, the removable ore-container cylinders, clamping devices for the respective ends of said cylinders, comprising bands that clasp around the outer surface thereof and terminate in threaded draw-bolt portions confined in the wheel-rims, and screw-nuts on said draw-bolts for tightening and loosening said clamping devices.

748,530. COAL-MINING MACHINE.—Robert Robinson and John H. Ball, Mystic, Iowa. In a mining machine, the combination of a carriage constructed to run on a track, a shaft mounted transversely to said carriage and bearing a bevel-gear and two ratchets, a yoke mounted on said carriage and having upwardly-extending apertured arms, a post having an apertured threaded stop mounted thereon, a screw journaled in the said apertured arms and engaging said threaded aperture in said stop and bearing a bevel-gear meshing with said bevel-gear on said first-mentioned shaft, and two hand-levers bearing hooked pawls engaging said ratchets to operate them to drive said screw.

748,536. PULVERIZER.—August Schoellhorn and Herman S. Albrecht, St. Louis, Mo. In a pulverizer, the combination of the casing or housing, a cage within the housing, inclined benches upon the outside of the casing or housing held in an immovable relation to the cage and provided with longitudinal slots near each end, upwardly-extending flanges at each end of the benches, journal-boxes slidable on the inclined benches between the upwardly-extending flanges, a hammer-supporting shaft carried by the journal-boxes, adjustable bolts carried by the hammer-supporting shaft and extending through the slots in the inclined benches, and a set-screw mounted in each flange for adjusting the journal-boxes.

748,551. ELEVATOR.—Arthur R. Wilfley, Denver, Colo. The combination with a box or casing having slotted sides, wheels opposite the upper and lower ends of the slots and endless chains extending around said wheels, or cross-bars extending through the slots in the box or casing and connected with the chains, and cups or buckets carried by these cross-bars.

748,558. BUCKET-DUMPING APPARATUS.—Homer K. McCaughey, Denver, Colo., assignor of one-half to George F. Emmert, Denver, Colo. In a bucket-dumping apparatus, the combination with the bucket-carrying car of a track having a curved downwardly-extending loop located at one end, the loop members being parallel and adapted to engage the car-wheels at two diametrically opposite points, a bucket connected with the car and provided with a depending part, and means located in the rear of the track-loop for catching the said depending part and holding the same during the bucket-dumping act.

748,561. SMELTING-FURNACE.—Elfego Riveroll, Los Angeles, Cal. In a smelting furnace, an inclined sinuous chamber, the upper end of which is gradually tapering its entire length in cross-sectional area and provided with means for feeding ore thereto, and a plurality of hydrocarbon-burners communicating with the chamber along its length.

748,562. SEPARATING-SCREEN.—Willard C. Rowe, Decatur, Ill., assignor to Union Iron Works, Decatur, Ill. A separating-screen composed of two sets of axially-rockable, obliquely-disposed slats having teeth forming obtuse angles at their bases with edges of the slats, a bar separating the two sets of slats, pivot-rods for the slats journaled in the separating-bar, one set of pivot-rods being out of line with the other set, crank-arms on the pivot-rods, a bar connected with the cranked ends of the pivot-rods and carried thereby, and means for adjusting the bar to vary the inclination of the slats.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending December 12, 1903.

27,555 of 1902. ELECTRIC SMELTING.—General Electric Company, Schenectady, New York, U. S. A. Making iron furnaces or muffles for electric smelting with an outside jacket of calcium carbide, to prevent the oxidation of the iron.

512 of 1903. MIXER.—Morgan Crucible Company, London. A mixer for finely ground minerals, consisting of two horizontal spiral conveyors, one within the other, on the same axis, but moving the material in opposite directions.

517 of 1903. MINERS' LAMP.—J. Naylor, Wigan, Improvements in miners' oil lamps that are ignited by electricity without opening.

704 of 1903. CEMENTATION OF IRON.—J. Lecarme, Paris, France. Cementing the surface of iron by covering with a plastic mixture of charcoal and a solution of a cyanide which gives off gases rapidly when heated and so accelerates the cementation process.

2,204 of 1903. MAKING HYPOSULPHITE OF SODA.—Badische Anilin & Soda Fabrik, Ludwigshafen-am-Rhein, Germany. A process for making hyposulphite of soda—$Na_2S_2O_4$—direct, by acting with metallic sodium on a solution of sulphurous acid in ether or alcohol.

16,350 of 1903. STAMP-MILL TAPPET.—Sandycroft Foundry Company, Ltd., Chester. Improved tappets for the shaft of stamp-mills.

20,646 of 1903. MINE-CAR COUPLING.—R. Davies, Swansea, Wales. Improved form of coupling pin for coupling colliery cars together.

21,467 of 1903. COAL-CUTTER.—A. Kumpfer & H. Hoppe, Mülheim-am-Ruhr, Germany. A coal-cutter consisting of a saw, which is oscillated backward and forward by hand round the supporting column, containing also an adjustable feed.

21,642 of 1903. DRYING BLAST.—J. Gayley, New York, U. S. A. Apparatus for extracting moisture from air supplied to blast-furnaces and converters.

21,665 of 1903. HARDENING COPPER.—S. & J. Oxnam, Wolverhampton. A method of hardening copper, particularly for use in the rubbing surfaces of dynamo commutators.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of the ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making this office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

TO ENGINEERS VISITING LONDON.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers nonresident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution, and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mining and metallurgical engineers are invited to keep the Engineering and Mining Journal informed of their movements and appointments.

Mr. E. N. Van Cortlandt, of Denver, is in New York.

Mr. A. Chester Beatty, of Denver, is now in New York.

Mr. A. F. Dressel, of Denver, Colo., is in El Oro, Mexico.

Mr. A. V. MacKenzie, of New Zealand, is in Oaxaca, Mexico.

Mr. W. W. Trigg, of Parral, Mex., is visiting Kansas City, Mo.

Mr. Auguste Mathez, of Denver, is expected in New York next week.

Mr. H. H. Ward, of Durango, Mex., has gone to California for his health.

Mr. Lucius J. Boyd is examining the Royal mine at Tallapoosa, Georgia.

Mr. Chester W. Purington has returned to Denver from Cananea, Mexico.

Mr. Burdon Gaylord, of Los Angeles, is in New York on mining business.

Mr. A. J. Bensusan has returned from the Transvaal, and is now in London.

Mr. Charles Janin, of San Francisco, Cal., is spending the winter in Mexico.

Mr. R. Frank Pearce and Mr. Arthur W. Pearce, of Denver, are in New York.

Mr. A. Quartano has left England to join a prospecting expedition in East Africa.

Mr. D. M. Reardon, of San Francisco, is visiting New York at the present time.

Mr. James R. Blake has been examining a manganese property in Parral, Mexico.

Mr. W. Forstner is manager of the Royal mine, in Calaveras county, California.

Mr. W. H. Paul, of Denver, is now visiting the Dolores mine, in Chihuahua, Mexico.

Mr. Myles Brown is mining engineer to the Shampore Coal Co., Ltd., in Bengal, India.

Mr. H. W. Hardinge, of Denver, is now in Mexico and will remain there about a month.

Mr. Wm. B. McKinlay is general manager of the Delta Gold Mining Co., near Wallace, Idaho.

Mr. Algernon Del Mar has gone from Pine Grove, Nev., to southern California on mining business.

Mr. H. T. Burls returned to London, en route from Alaska, by the *Ivernia*, which sailed on January 9.

Mr. L. H. Jansen, of Kansas City, has returned from professional work in Alabama and Oklahoma.

Mr. H. E. West, recently in Montana, is now manager of the Leonosa mines, at Matagalpa, in Nicaragua.

Mr. Charles Reidt, general manager of the Peñoles Mining Co., Mapimi, Mex., is visiting San Antonio, Texas.

Capt. F. D. Behrend, of London, arrived by the *Majestic* on December 30 and remained in New York for a week.

Mr. Thaddeus S. Dayton, manager Mexico Mine & Smelting Supply Co., is in the United States for a month's trip.

Mr. Newton B. Knox has returned to San Francisco, on the completion of professional work at Cananea, Mexico.

Mr. Edward H. Morrison, vice-president of the Alaska Smelting & Refining Co., is in New York at the present time.

Mr. Paul Johnson, smelter manager of the Alaska Smelting & Refining Co., at Katchikan Alaska, is visiting New York.

Mr. Philip Argall, of Denver, is in Mexico. After going to Chihuahua, he will proceed to Mexico City and the region south of it.

Mr. Alfred J. G. Swinney left England on January 2 for British Columbia, to take the supervision of extensive mining operations.

Mr. B. B. Thayer has resigned the management, of the Santa Rita Mining Co., and has opened an office at 11 Broadway, New York.

Mr. Ross E. Browne has accepted an appointment on the engineering staff of Wernher, Beit & Co., and is now on his way to the Transvaal.

Mr. Charles O. Ellingwood, in charge of the San Francisco offices of the Western Exploration Co., has returned from a trip to Salt Lake, Utah.

Mr. Thomas Edwards, of Ballarat, Australia, left New York by the *Celtic* on January 13, homeward bound, after a pleasant visit in this country.

Mr. Charles S. Palmer, formerly president of the State School of Mines, at Golden, Colo., is now chemist to the Anaconda Copper Mining Company.

Mr. L. M. Terry, accompanied by Mr. H. F. Lefevre, left New York in the early part of this week for a trip to the western part of Chihuahua, Mexico.

Mr. Percy L. Fearn has recovered from his recent illness and left New York on January 2 for a professional trip to Idaho, Arizona and New Mexico.

Mr. J. H. Curle is on his way from Melbourne to Port Arthur, whence he will proceed into the interior of Siberia on important professional work.

Prof. J. Dunraven Young, of Chicago, accompanied by Mr. E. A. Franke, has gone to the Black Hills, South Dakota, to examine several tin properties in Lawrence county.

Mr. Arthur J. Herschmann has taken an office at No. 45 Broadway, New York. He will make a specialty of heating, lighting and ventilating plants, their installation and supervision.

Mr. Leonard D. Sivyer, of Spokane, Wash., who has been at Globe, Ariz., also near Carter's, Tuolumne county, Cal., examining on the mother lode for Los Angeles men, is again at Globe, Ariz., in the interest of Boston people.

Capt. James H. Cundy, prominently identified with mining in the Lake Superior region nearly 40 years, has resigned as superintendent of the Cundy mine of the Oliver Iron Mining Co., at Quinnesec, Mich., effective January 1, and will retire to private life.

Mr. Thomas R. Stockett, general superintendent of the Crow's Nest Pass Coal Co., Fernie, B. C., has been in Chicago. He reports that the company has developed mines with a total production of over 4,000 tons daily and that it is producing about 1,000 tons of coke daily.

Mr. Irving H. Reynolds, for many years in charge of the pumping engine department of the Allis-Chalmers Co., has accepted a position with the William Tod Co., of Youngstown, O., as consulting engineer, and is in charge of the department devoted to the building of large high-duty crank and fly-wheel pumps, giving most of his attention to this branch of the business.

Mr. Samuel A. Parnall has assumed the superintendency of the Calumet & Arizona mine, succeeding Mr. I. L. Merrill, whose resignation was caused by ill health. Mr. Parnall will also have charge at the Calumet & Pittsburg, Lake Superior & Pittsburg and the Pittsburg & Duluth properties, which are all under the management of Lake Superior interests.

OBITUARY.

Simon Dessau, of Dessau & Co., importers of carbon and bort, died January 10 at his residence, in New York, of pneumonia, after a brief illness. Mr. Dessau was born in St. Louis in 1852. When 18 years old he went to New York City and became connected with a diamond house. He established himself in business over 20 years ago as a dealer and importer of carbon and bort. He afterward formed the Dessau Carbon Co., the Dessau Milling Co, and the S. Dessau Co. He owned the Millie iron mine, near Iron Mountain, Mich. He is survived by a widow, three sons and a daughter.

SOCIETY AND TECHNICAL SCHOOLS.

GEOLOGICAL SOCIETY OF AMERICA.—At the recent annual meeting at St. Louis, Prof. H. L. Fairchild, University of Rochester, was elected president; Prof. J. C. Branner, Stanford University, secretary, and Prof. I. C. White, University of West Virginia, treasurer.

NEW YORK ACADEMY OF SCIENCES.—Officers have been elected as follows: President, Edmund B. Wilson; vice-presidents, section of geology and mineralogy, James F. Kemp; section of biology, L. M. Underwood; section of astronomy, physics and chemistry, Charles Lane Poor; section of anthropology and psychology, F. J. E. Woodbridge; corresponding secretary, Richard E. Dodge; recording secretary, Henry E. Crampton; treasurer, Charles F. Cox; librarian, Ralph W. Tower; editor, Charles Lane Poor; councilors (to serve three years), Livingston Farrand, E. O. Hovey; finance committee, John H. Hinton, C. A. Post, Henry F. Osborn.

INDUSTRIAL.

The address of the Gibbs Engineering & Manufacturing Co. is now Glendale, Long Island, New York.

The Mexico Mine & Smelter Supply Co. has placed a large order for specialties with the Burt Manufacturing Co., of Akron, Ohio.

The Star Drilling Machine Co., Akron, O., it is reported, is to build a small factory at Chanute, Kan.

The Ruby Mining & Milling Co., of Nevada, in its mine and mill equipment, has placed orders for a large Fairbanks-Morse gasoline engine and a Wilfley concentrating table.

The H. K. Porter Co., of Pittsburg, Pa., recently secured a contract for four oil-burning locomotives for use on the National Tehauntepec Railway, which road the British contracting firm of S. Pearson & Co., Ltd., is building across Mexico.

A force of workmen from the Pencoyd plant January 5 helped start the bridge plant of the American Bridge Co., at Pittsburg, Pa. Skilled workers from the Shiffler, Pittsburg and Keystone plants were also put to work. Ultimately the plant will employ 10,000 men.

The Jones & Laughlin Steel Co. has issued an official statement to the effect that a reduction of wages had been made effective January 1. B. F. Jones, president of the company, is said to have stated that the proposed reduction had been agreed to by all the employes.

The additions to the plant of the Westinghouse Electric & Manufacturing Co., at East Pittsburg, will be put in operation shortly, and several thousand men added to the present force of employes. The two new buildings are each 1,658 ft. long and 231 ft. wide, and correspond in size and construction with the present buildings of the plant.

The Marengo Portland Cement Co., recently organized at Detroit, Mich., with a capital stock of $1,500,000, will build a cement plant of 2,000 bbl. capacity per day at Marengo, Ind., at a cost of about $300,000. Construction will begin immediately. The officers are: President, Frank W. Wheeler; vice-president, George L. Holmes; secretary, R. H. Evans, and treasurer, John Lokie.

The C. O. Bartlett & Snow Co., Cleveland, O., is erecting a crusher and coal conveying

outfit capable of handling 40 tons per hour for the Newburg mills of the American Steel & Wire Co., and a similar outfit for a plant near Chicago. The company is also building a large Portland cement outfit for the Owen Sound Portland Cement Co., of Vancouver, B. C., and a conveying outfit for handling large hot rivets for the Vulcanus Forging Co., of Cleveland.

The British Johns-Manville Co., Ltd., has been incorporated under the British limited liabilities act, for the purpose of undertaking the British selling end of the H. W. Johns-Manville Co., of New York city. The company's headquarters will be in London. E. Bergtheil, of the British electrical engineering and contracting firm of Bertheil & Young, is a director. H. J. Joseph is to be the manager of the company. G. W. Becker, formerly of the H. W. Johns-Manville Co.'s New York offices, will be a director.

The stockholders of the Otto Gas Engine Works have decided to increase the capital of the corporation from $600,000 to $2,500,000 and build a large, new plant just as soon as the management can find a suitable site. Large gas engines, producer gas plants, launches and marine engines, gasoline hoists, compressors and other adaptations of the gas engine will be built promptly at the new plant. A suitable site must contain not less than thirty acres, must be located on a good water front, and must have good railroad facilities.

One of the features of the new plant of the B. F. Sturtevant Co., at Hyde Park, Mass., is a steam tunnel 4½ ft. wide and 6½ ft. high, extending from the power plant a total distance of about 800 ft. This tunnel, which is of concrete construction, will not only accommodate all of the steam piping, but also the electric wires for power, light, telephone, standard time clock, and other service, together with oil, hot water and other pipes for general distribution to the various buildings of the plant. None of these features of the equipment will be carried above ground at any outdoor point.

The business of the American Sheet Steel Co. and the American Tin Plate Co. will hereafter be conducted under the name of American Sheet & Tin Plate Co., with the following organization: George G. McMurtry, chairman of the board of directors; W. T. Graham, president; W. M. Leeds, first vice-president; E. W. Pargny, second vice-president and manager of sales; W. P. Beaver, assistant to president; John Warner, assistant to first vice-president; Howard M. Davis, assistant manager of sales; H. B. Wheeler, secretary and treasurer; H. L. Austin, auditor; G. W. McGinnis, assistant auditor; C. W. Bray, chief engineer, Pittsburg; R. A. McKinney, purchasing agent, Pittsburg. The general offices of the company will be moved from Battery Park building, New York, to Pittsburg soon, but until further notice officers as above can be addressed at New York, with the exception of Mr. Bray and Mr. McKinney. The following district sales agents have been appointed: Frank Dickerson, Battery Park building, New York; W. H. Eaton, Marquette building, Chicago, Ill.; W. J. Wetstein, St. Louis, Mo.; I. B. Williams, San Francisco, Cal.; Richard R. Hoge, Portland, Ore.; E. W. Sparhawk, Denver, Colo.; J. R. Scott, New Orleans, La.; W. T. Shannon, Cincinnati, O. The Detroit sales office has been discontinued. The Pittsburg sales office will be merged with the general sales office when the offices are moved.

TRADE CATALOGUES.

The Northern Electrical Manufacturing Co., of Madison, Wis., has issued a small catalogue devoted to its style B frames, a new size built to meet the demand for small machines. Attention is called by the company to the Northern spherical motor, which can be supplied and arranged for attachment to side wall or suspended from ceiling.

The Power & Mining Machinery Co., a consolidation of the Loomis-Pettibone Gas Machinery Co., of New York, and the Holthoff Machinery Co., of Cudahy Wis., issues a 12-page catalogue devoted to the Crossley gas engine and Loomis-Pettibone gas producer. A more recent publication of the company is confined solely to the American Crossley gas engine, giving working drawings of many parts. This latter catalogue is artistically made up, and contains a number of superb illustrations.

A new catalogue of chemical appartus and assay appliances has lately been issued by Henry Heil Chemical Co. It covers 521 pages, and is most complete. The company was established in 1866 and incorporated in 1888, and has grown to a large and prosperous firm, with excellent facilities for supplying the wants of the chemist and assayer. As agents of the Morgan Crucible Co., Ltd., Battersea Works, London, S. W., the company furnishes the well-known Battersea fire-clay goods, such as crucibles, scorifiers, muffles, annealing cups, furnaces, etc.

The Gem Manufacturing Co. has recently compiled and issued a complete catalogue of its oilers, torches, mill and foundry supplies, lubricators, etc., containing about 78, 5 by 7 in. pages. The oilers, of which the company is the sole manufacturer and patentee, are shown in many styles and sizes, and in different grades and materials. Complete oiling outfits are also shown, with the price per set and for the individual oilers. One illustration represents a complete portable drill plant, consisting of a flexible counter shaft, drill press, etc., all manufactured by the company, with prices for the many different sizes. Driving ropes, press drills, a portable emery grinder and many other small mechanical devices are shown and described.

SPECIAL CORRESPONDENCE.

Denver. Jan. 9.

Ever since the Telluride district has been under military protection, the union agitators have openly stated on the streets that they would be in control as soon as military protection was withdrawn and would then wreak vengeance on any against whom they had personal grievances. Since martial law was instituted on Jan. 3 upwards of 50 strike leaders and agitators, many of them Italians, or other foreign-born miners, have been arrested, conveyed by railroad to points outside the county, there liberated and warned not to return. It is said that this course will be continued until every disturber has been expelled from the district. Efforts are also being made to find the rifles used in the bloody riot at the Smuggler-Union mine in July, 1901.

At Cripple Creek, the judge of a local court on January 7 issued an injunction restraining the military from deporting members of the Western Federation of Miners. Governor Peabody says that no attention can be paid to such injunction, while the officer in charge of the troops in the district says that law-abiding citizens will not be arrested. The Mine Owners' & Operators' Association of the district held its first annual meeting on January 4, with every important mine in the district represented, except the Portland. Provision was made for a permanent fund for the furtherance of the interests of the association.

The long-pending criminal prosecution begun in 1899, of W. S. Montgomery, for alleged fraudulent conspiracy surrounding the entry and patenting of the celebrated Hull City placer in the Cripple Creek district is set for jury trial in the Federal Court, Denver, on January 25.

During the week the trial of the union miners charged with the dynamite outrage at the Sun and Moon mine, at Idaho Springs, last July, has been in progress at Georgetown. Bate, former president of the local union, turned State's evidence and threw much light on the methods of the union. The defence put in no evidence. One of the prosecuting attorneys says that had the State had the evidence it now has, Moyer, president of the Western Federation of Miners, would have been made a defendant, as it is alleged that he said to Bate: "I guess the boys will have to do their work in the night time."

Although the National Executive Board of the United Mine Workers, at Indianapolis, Ind., on January 5, decided to support the coal-miners' strike in southern Colorado, it looks as if the end of that strike is approaching through the importation of large numbers of non-union miners to take the places of the strikers who refuse to go back to work.

By the overruling of a demurrer filed by the plaintiffs in the suit of Stratton's Independence, Ltd., at the instance of the Venture Corporation, against the Stratton estate, Judge Riner, of the United States Circuit Court, at Denver, practically took the ground from under the plaintiff's case.

The English company brought the action, alleging that misrepresentations had been made to it relative to the condition of the Independence mine, that certain parts of the workings had been salted, etc., and that by reason of such misrepresentations it was induced to purchase the property, paying $10,000,000 therefor. It then alleged that by reason of the fraud, which it claimed was so perpetrated, it sustained damages to the amount of $6,000,000.

To this complaint the defendants filed an answer in the first defense, of which they denied all of the allegations of fraud, salting, etc. They then set up five separate defenses, the most important of which were:

First, That Stratton's Independence, Ltd., paid Mr. Stratton no money whatsoever for the property; that the company was organized by him and issued to him all of its capital stock in exchange for the property which he conveyed to it; that Mr. Stratton obtained no consideration from the company except its capital stock which had no value save it was given value by the property which he conveyed and that the plaintiff could not recover any damages because it did not, in fact, pay Mr. Stratton any money at all.

Second, That the action was brought before the appointment and qualification of the executors and was therefore premature.

Third, That the cause of action did not survive after the death of Mr. Stratton, against his executors.

Judge Riner held that if it were true that Mr. Stratton received no money from the company, direct, but merely received its capital stock for the property, the company could not maintain its action for damages. In other words, if anyone was defrauded, it was the purchaser of the stock and not the company itself. Judge Riner also held that this cause of action did not survive against the executors, but that it died with Mr. Stratton.

The executors consider that this is practically a determination of the case and understand that Judge Riner intimated that if the facts were as alleged by them in the defendant's answer, there was no use in proceeding to any trial because the questions of law raised by the defendants were conclusive of the case.

San Francisco. Jan. 9.

(From Our Special Correspondent.)

The State Anti-Debris Association has won a signal victory over the miners by the Supreme Court's decision in the case of Yuba county vs. the Kate Hayes Mining Co., an action brought to prevent the defendants from conducting hydraulic or ground sluice mining in Nevada county, and also from using its water to aid other miners by the same processes. The Supreme Court held that all material allegations of the complainants were sustained by the testimony and that it appeared that the defendants were mining by the ground sluice process, which, according to the evidence, produced the same effect in kind as the hydraulic process, only to a less degree.

In this decision the Supreme Court affirms the doctrine that injury to the streams or adjacent lands by either hydraulic or ground sluice mining is prohibited as constituting a public nuisance, and any county may enjoin the commission of such acts. The Anti-Debris Association has for many years been endeavoring to stop hydraulic mining and also to control water ditches so they cannot be used for mining purposes.

Congress prohibited hydraulic mining in the drainage basins of the Sacramento and San Joaquin rivers, but said nothing about the ground sluicing, the Caminetti law saying expressly that "hydraulic mining is hereby declared to have the meaning and application given to the term in the State of California." The legislature of California amended the civil code and exactly defined hydraulic mining as follows: "Hydraulic mining, within the meaning of this title is mining by means of the application of water, under pressure, through a nozzle, against a broad bank."

Now the Supreme Court has broadened both

the State and Congressional acts so as to include ground sluicing. This last decision will therefore still further reduce the output from gravel mines in California, since it would seem from the decision that miners intending to ground sluice will have to apply for a permit just as for hydraulic mining. It also gives a chance for miners to be blackmailed; there are more ground sluice men than hydraulic miners, and they are more widely scattered in the different counties. This decision is therefore almost a knockout blow to gravel miners, and it seems pretty certain before long the association will try to compel quartz miners to impound their tailings. Mills of 50 and 100 stamps make large amounts of tailings.

This leads to the conclusion that the California Miners' Association will have to be up and doing to counteract the activity of the State Anti-Debris Association. The last miners' convention was hardly a success. The miners seemed to be apathetic and two of the largest counties were not represented; but if there is no great associated body to take the subject up, each man will have to make his individual fight against the aggregated forces of the anti-mining people of the valley counties. The miners' association should be strengthened; should have more members and active officials, or the mining industry is bound to suffer.

The Anti-Debris Association in its suit through the county of Yuba against the Kate Hayes Mining Co. lost two points. By the decree of the lower court the defendants were restrained from suffering others to use the water supply or any part of it for washing into streams or gulches any earth, rocks, clay or sand in any other ground or mine, with the knowledge that the water was to be used for such purposes; and were also restrained from selling, leasing or in any manner transferring or disposing of their mine or mining ground, or the water supply to any person for the purpose of being worked by hydraulic or ground sluice process and the mining debris discharged into the creek or river or any of its tributaries, with knowledge of such purposes.

The Supreme Court knocked these two contentions out and reversed the judgment of the lower court. The Anti-Debris Association has tried for years to prevent mining companies selling water to others for hydraulic mining. The reversal of the point restraining the miner from selling his ground for hydraulic or ground sluice mining and the point preventing his selling his water to others for similar purposes make the only balm for the miners in the decision.

By deeds filed in San Diego it seems that the suit of Wright and others against Tannenbaum & Co., of New York, and the Himalaya Mining Co., interested in the tourmaline deposits at Mesa Grande, has been settled. The papers filed indicate that the Himalaya Co. has bought the Wright claims.

The North Star Mines Co., of Grass Valley, declared a share dividend of 50c. on December 23, aggregating $125,000, this being the tenth dividend since James D. Hague came into control. The mines are now one of the best producers on the coast, though at one time considered worked out. It never looked better than now, after many years of ore production. Last week on the 3,700-ft. level the men uncovered a magnificent body of very rich ore, which they describe as looking like a "jeweller's shop." This week the company purchased the Loutzenheiser ranch of 220 acres, and also the Lamarque mine, supposed to be rich in mineral, thus giving the company the largest acreage of mining ground in Grass Valley district. At the Central shaft a new mill is to be built with 40 stamps and room for 40 more. This with the 40 stamps already in operation and the 10 stamps at the Gold Hill will make a total milling capacity of 130 stamps.

The Royal Consolidated, at Hodson, has a few men at work, but not by any means as many as wanted. The Gladstone, at French Gulch, Shasta county, closed some months, is trying to get non-union men and start again. The Union, in El Dorado county, is still closed. In Tuolumne county a number of mines are still shut down. Of those properties which were closed during the dry season, the Harvard, Campo Seco and Crystalline have not again started. The Mazeppa is still closed. The App began work again last week, but with a small force. The Black Oak has not started since the strike.

The sale of the Sweepstakes hydraulic mine, in Trinity county, and the subsequent investment of some hundreds of thousands of dollars in ditches, etc., was the talk of California mining circles a few years since. Now Robert J. Anderson, representing the buyers, has brought suit against John F. and Edward A. Davis and Frank Hall to recover $250,000, paid to them for the mine, and also wants compensation for expenditures of several hundred thousand dollars for securing water rights and supply. The pipe lines and equipment cost $700,000, and $250,000 was paid in two installments. The complaint alleges that the defendants or their agents "salted" the gravel. The outcome of the trial is looked for with interest. The standing of the defendants is such that the suit is a surprise.

The Cordilleran section of the Geological Society of America has been holding its meetings at the University of California during the week and a number of papers have been read.

Spokane. Jan. 9.

The Northern Pacific and the Oregon Railway & Navigation companies announce new freight rates on ores from the Cœur d'Alenes to Perth Amboy, N. J. On minimum carloads of 15 tons, the Oregon Railway & Navigation Co. quotes $12 a ton, if released, to a value of $50 a ton. The present tariffs run from $13 to $17. The Northern Pacific quotes the same rate on ore released to $60 a ton.

Numerous improvements are under way at the Tacoma smelter, controlled by interests which own the Bunker Hill & Sullivan mine, and the Alaska-Treadwell. A bag-house, 11 by 60 ft., is nearly completed, to contain 1,000 bags, each 25 ft. long by 2 ft. in diameter. It should be ready in two months. The fourth lead stack should be running this week. The plant will handle 300 tons of copper ore and 500 tons of lead ore daily.

The most important new property being opened near here this winter is the Continental, on Mount Klockmann, just south of the International boundary, and 20 miles west of Porthill, Idaho, on the Kootenay river. It was acquired some time ago by Duluth, Minn., iron men, who have spent much money on it. The property has been moderately developed for 3,500 ft. along the great Continental lode. A tunnel is in 600 ft. on the Blue Joe claim, where four men are taking out five tons a day. On the middle claim, the Jasper, a short tunnel shows a shoot of shipping ore 3½ ft. wide, with about 25 ft. of milling ore. On the top of the hill, 6,000 ft. high, in the Continental claim itself, with a 254-ft. shaft and an adit, one stope is being worked and a second is being started. The ore is said to run from 60 to 70% in lead, and 40 oz. in silver.

In all about 120 men and 130 horses are employed mining and sledding ore to Porthill, where it is shipped via the Great Northern to the Tacoma smelter under a $16 freight and treatment rate. As the snow permits the company expects to get out 50 tons daily. The Idaho-Continental Mining Co., a Duluth corporation, including Harry Roberts, W. T. Bailey, Henry Turrish and A. Klockmann, has acquired two-thirds of the three claims in the group. Bonds on the remainder, owned by State Senator C. S. Heitman and Dr. Wenz, of Rathdrum, Idaho, were taken up a few weeks ago by W. T. Bailey, who paid $45,169. Mr. Bailey expects to turn his interest over to the company. William Roberts is mine superintendent.

Victoria, B. C. Jan. 5.

(*From Our Special Correspondent.*)

Vancouver Island coal production in 1903 was divided among the three collieries, as follows: Western Fuel Co., 218,136 tons, of which 178,960 tons were exported and 110,176 tons sold in local markets; Wellington, 271,305 tons; Comox, 309,708 tons. In 1902, the Vancouver Island mines produced 1,173,893 tons of coal.

Nelson District.—Ore receipts at the Hall mines' smelter, Nelson, for the 11 months to November 30 were as follows: From Nelson and Kootenay lake, 3,418 tons; Rossland, 180 tons; Slocan, 4,720 tons; Boundary, 93 tons; East Kootenay, 894 tons; Ymir, 2,619 tons; Lardeau, 173 tons, and Republic (Washington), 5,309 tons; total, 17,406 tons. Of these ores 8,155 tons were dry, and 9,251 tons were lead ores. The metal contents were 762,494 oz. silver, 7,572 oz. gold, 2,925 lb. copper, and 8,629,432 lb. lead. The foregoing tonnage and metal contents do not include Silver King or Emma (Boundary) ores. Probable total receipts for December from all sources excepting the two mines just mentioned were 1,820 tons.

The company shipped to the Selby Smelting & Lead Co., San Francisco, 3,443 tons lead bullion, containing 655,270 oz. silver, 6,324 oz. gold, and 6,697,946 lb. lead, total value $574,387; and to the Granby Consolidated Mining, Smelting & Power Co., Grand Forks, 383 tons copper matte, containing 119,804 oz. silver, 144 oz. gold, and 372,003 lb. copper, total value $102,054. Probable shipments of bullion during December, 400 tons. The company purchased 4,600 tons Silver King ore, containing 119,885 oz. silver and 347,333 lb. copper, and the lessee of the mine, Mr. Davys, estimates that the tonnage for December will be 300 tons. Receipts of ore from the Emma mine totalled 18,691 tons. Lead ores shipped to United States smelters by the company during the year amounted to 2,946 tons.

Rossland.—The ore receipts at the Canadian Smelting Works, Trail, during 11 months ended November 30 last were 157,736 tons, as follows: From Rossland, 135,516 tons; Boundary, 6,900 tons; Slocan, 5,178 tons; Lardeau, 2,047 tons; Nelson and Fort Sheppard, 1,515 tons; Republic (Washington), 4,638 tons; Windemere, 806 tons; East Kootenay, 366 tons, and miscellaneous, 770 tons. The approximate tonnage from Rossland for December was placed at 12,000 tons, and from all other parts, possibly 1,000 tons. During the year the daily capacity of the lead refinery was increased from 6½ tons to 20 tons, and a plant was erected for handling the slimes. The refinery turned out some 150,000 oz. silver of the fineness of .999, several thousand ounces of mint gold, and a quantity of copper sulphate. The antimony will be recovered later and will be used in making babbit metals.

The copper matte from these works was refined at Tacoma, and the lead bullion, other than that refined at Trail, was shipped to San Francisco, Cal. The lead produced was sold chiefly in eastern Canada, China and Japan. The silver refined was sold for coinage for the Philippines. The gold went to the United States Government assay offices, Seattle, Washington.

San Luis Potosi. Jan. 5.

(*From Our Special Correspondent.*)

The Mexican Monetary Committee has at last made its recommendation to the Mexican Government. In substance it recommends that to establish a fixed rate of exchange between the Mexican silver and gold coins, the Government should close the mints to the free coinage of silver, and coin a new dollar and subsidiary pieces, the new coins to be practically the same as the old, but of new design, the old to be redeemable at par in the new if at present in the Republic. To prevent the bringing in of all the old Mexican coins that are in foreign countries an import tax shall be levied upon them, and the time of redemption limited, such limit being largely dependent upon the time required for the Government to coin sufficient of the new for redemption. The committee also recommends the coinage of $10 and $20 gold pieces, based on those of the United States of the same denomination; the establishment of a gold reserve, and advises that the ratio be not fixed suddenly, but gradually, as the gold reserve fund accumulates. This is practically what has been expected from the committee for some time, and it is believed the Government will follow as closely as possible the recommendations. In connection, it may be stated that according to the cash holdings of the Government, the chartered banks and private banks, the present coinage is about $7 silver per capita, on an estimated population of 14,000,000.

In Jalisco, Dwight Furness, of Guanajuato, and several of his associates have formed the Rosario Mining Co., to develop some of their holdings in the Mascota district, with W. Oli-

ver of Ameca, in charge. In Hidalgo, La Providencia and El Almadeu, near Tulauciugo, have been sold for $100,000 gold to J. M. Erskine, on the reports of Francis Reed and O. B. Hardy. The properties contain about 100 *pertinencias*, with a good showing of free-milling gold and silver ore, for which a mill will be erected. There is also said to be a vein of 4% cinnabar.

In the El Oro district of Mexico the Old Abe has cut the vein, but the call for assessments has been more than some companies could stand, and they are preparing to close up. The Sullivan, Lill, Jupiter and Noche Buena all have shafts down about 150 ft., machinery practically installed, and will soon resume sinking. The Presa Nueva and the Skeeney Mining Co. have resumed. The Alexandria Gold & Silver Mining Co. is a new concern, with a capital of $500,000 gold, from Milwaukee, with F. D. Underwood of the Erie railroad, president, and E. H. Vivian general manager, which will work the Alemania, adjoining the Dos Estrellas, and the La Poloma, adjoining the Lill and Noche Buena.

Exchange on New York remained practically stationary during the past week at 227½.

Mining stocks have attracted little attention. Dos Estrellas dropped from $2,500 to $1,960; Victoria went from $160 to $165; Aldebaran brought $70; Old Abe, $33; Noche Buena, $15, and Santa Rosa could find no takers at $4. La Paz, of Matehuala, sold for $193; Amistad y Concordia $86, and Santa Gertrudis $87.

Ten of the principal mining companies which publish dividends distributed $500,000, Mexican, during December, the leader being the Peñoles Mining Co., of Mapimi, Durango, with its regular $100,000 monthly.

London. Jan. 2.

(*From Our Special Correspondent.*)

The sentence of Anthony Stanley Rowe to 10 years penal servitude is another example of the severity and celerity of action of the English criminal law in cases of offences against property. There were a number of accusations against him, but the only one dealt with in detail was for obtaining a loan of money with a forged share certificate as security. There was no attempt at defence, as the facts were all perfectly clear. At the trial his past history was gone into. It was shown that many years ago he had served nine months' imprisonment for a somewhat similar offence, and that while in the service of Streeters, the jewellers, had misappropriated funds, though he had not been prosecuted for it. It was, of course, due to these facts that his present sentence was made so severe. It will be remembered that a couple of years ago, when Messrs. Fry & Everitt were convicted of obtaining advances from bankers on fictitious ore warrants, the sentence was five years, but it was their first offence. The revelations of Rowe's past life came as a great surprise to every one, and naturally added to the sympathy already felt for Mr. Moreing in connection with the unfortunate episode. Rowe's undoubted ability was worthy of a better cause.

The Copiapo Mining Co., operating copper mines in Chile, has decided to revise its system of accounts in an enlightened way, by charging developments and opening out to revenue instead of capital. On June 30 last there was £17,705, which had been charged in previous years to developments and opening accounts instead of to revenue. This operation of creating a debit to capital account had, of course, the effect of making the mining profits apparently greater, and made it possible to declare a dividend. During the last year or so I have frequently referred to this question of charging developments and extensions to revenue or to capital, and till quite recently it was the orthodox plan to charge as much to capital as possible. The illogical nature of such a method of finance has been brought forward lately, and many of the leading houses have departed from it in favor of charging everything to revenue. It is, therefore, interesting to note specific cases of this change of policy. The Copiapo Co. is an old stager, having been started nearly 70 years ago, and the direction is in the hands of eminent metal merchants. I have so often used this column for exposing fake schemes that I believe your readers in America have acquired an idea that there is no capable or honest mining operations in London. This is, of course, quite a mistake. There are a great number of well managed mines directed from London, and the Copiapo is one of them. During the year ended June 30 last the net distributable profit was £18,448, but the directors have deemed it best, as already mentioned, to use this in extinguishing the debits standing at development account. By doing so, the additional advantage is obtained that the assets become approximately equal to the nominal capital. The old Dulcinea mine is not developing well with depth, and the lower grade, combined with the extra cost of working at depth, cause some anxiety. A good deal of work is now being done in some of the upper levels that caved in some years ago. Ore is known to exist there, and as other parts of the mine are lean, it is good policy to attack the caved-in portions again. On the other hand, the Ojancos properties appear to be on the point of paying, after having been disappointing for a long time. The probability is that the company will be able to make profits for many years, though not on a large scale. The management is in good hands, which is a particularly important advantage at mines of this character.

During the last few years a great deal has been heard of the Smelting & Refining Co. of Australia. Although apparently prosperous and well managed, there is an air of mystery about the proceedings which is extremely disconcerting to shareholders. It will be remembered that the works at Dapho, New South Wales, were first started by Mr. John Howell, who, however, did not make a success. After lying idle for a few years, Mr. A. A. Blow came along and, with the help of Mr. Reginald Ward and others, resuscitated the company and remodelled the works. During the past year, operations have been in full swing and six months ago an important contract was made to smelt New Caledonian nickel ore. So far everything seems favorable to the company, but the air of mystery is caused by the fact that some unknown person or persons is trying to capture the company. Such proceedings are common in America, but the same sort of tactics are not usually pursued here, as the ownership of shares cannot be kept secret. The first intimation of the move was made last summer, when it was announced that certain parties, presumably unknown even to the directors, had, through their lawyers, undertaken to guarantee interest and dividends for five years and to enter into a contract to provide large supplies of ore. Afterward it was announced that these parties had backed out of the agreement, and had made a bid for the whole business instead. It was expected at the meeting of shareholders last week that details would be forthcoming, but instead of that the directors announced that they had nothing to say, and to disarm criticism invited the nomination of a committee of shareholders to work conjointly with the board in investigating the situation and arriving at a decision about the offer. The directors vaguely say that the negotiations were with an important Anglo-American group of capitalists, but do not specify the names. Personally, I have no inside information. I may say, however, that the Anglo-American group consists of very much the same people who introduced the Utah Consolidated and the Boston Consolidated into this country, and sold the former to the United Metals Selling Company.

Johannesburg. Dec. 7.

(*From Our Special Correspondent.*)

For the first time in the history of the Transvaal, those formerly known as "Uitlanders" are having the excitement of an election, in which all white British subjects can take part. It is an historic event in the political life of Johannesburg. Men are going about the mines handing cards to every possible voter, reading "Vote for X. Y. Smith, the miner's champion," etc. Election day is this week, and every opportunity will be given the miners to cast their votes.

For the past 18 months, or two years, the city has been run by a municipal council, appointed by Lord Milner. Most of these well-trained councillors are offering themselves for election. They, with a few others, form what is called the "United Conference Ticket," and it is highly probable that the majority of 20 town councillors to be elected will be chosen from this ticket. There is a reform party, also independent candidates.

All candidates seem to favor the municipalization of water, lighting, tramways and sewerage. Some favor the ward system of representation; others do not. The people here do not elect the mayor. He is chosen by the councillors from their number. No alien is allowed to vote, even in municipal elections. There was some soreness over this at first, but if aliens were given the municipal franchise, the only one they take an interest in, few would become British subjects.

Three prominent citizens of Johannesburg some time ago vehemently upheld the idea of "unskilled white labor" for the miners. For political reasons there might have been justification for their position, but since then one of these men, a mine manager, has had to resign; another, Mr. Wykerg, minister of mines, has sent in his resignation, and the last, the editor of the leading paper, the Johannesburg *Star*, has also resigned. So it looks as if "the all-white labor idea" is doomed.

The findings of the Labor Commission has excited little surprise. The Chamber of Mines is now asking for power to import indentured, unskilled colored labor. Mr. Perry, of the Witwatersrand Labor Association, is now on his way to Hong Kong, where he will superintend the preliminary arrangements for the recruiting and shipment of Chinese laborers. There should be a few Chinese here in May.

Another suggestion for the solution of the labor problem has been made, namely, that Madagascar should be investigated. But the French Government would probably object, and the natives will not work. The writer was in Madagascar three years ago, and noticed that very few natives were laborers. The French find it impossible to get sufficient labor from a population of 4,500,000 for building railroads and other public works in Madagascar, and one of their eminent engineers recommends that Hindoos or Chinese from Indo-China be imported.

LANE CARTER.

GENERAL MINING NEWS.

Petroleum Developments.—The monthly summary of operations in the eastern oil fields during December, according to the Oil City *Derrick*, is as follows: Pennsylvania completed 678 wells, 163 dry, with a daily production of 6,924 bbl.; Indiana completed 290 wells, 27 dry, with a production of 3,929 bbl.; Ohio, Trenton rock field, completed 325 wells, 32 dry, with a production of 3,727 bbl.; West Virginia completed 154 wells, 49 dry, with a production of 3,743 bbl.

There were 1,293 wells completed in the Pennsylvania and Trenton rock oil fields in December, inclusive of 222 dusters, and the new production was estimated at 14,580 bbl. Compared with November, there was a decline of 264 wells completed and 52 dry holes, accompanied by a gain of 288 bbl. new production. On the last day of December the Pennsylvania and Trenton rock oil districts contained 723 rigs and 1,442 wells drilling.

ARIZONA.

COCHISE COUNTY.

(*From Our Special Correspondent.*)

Calumet and Arizona.—The first dividend of $1.50 regular and 50c. special was paid December 19. It called for $400,000. The company closes the first year of production with a surplus of cash and copper of about $1,000,000, after having paid the above dividend and liquidated a debt of nearly $400,000, incurred in equipping mine and smelter plant. Since the second smelter blew last August the stacks have averaged 1,250,000 lb. copper per month. No. 3 is now ready. All underground work so far has been from the Irish Mag shaft, a 3-compartment at the north end of the property. This is developed to the 1,150-ft. level, has ore on the 1,250-ft., and is sinking another lift. It is now 1,290 ft. deep. About 1,500 ft. southerly from the Mag shaft is the large new Oliver shaft, down 525 ft., in promising ground. If

ore is found the company will erect additional smelting capacity and probably double its output. Drifts from the Mag shaft westerly to Hope and Wagner claims are passing through encouraging ground. Little or no flux is needed in smelting, the coke burden is light, and little value remains in the slag.

GRAHAM COUNTY.

Irish.—The Irish Mines Co. has been formed with a capital stock of $500,000 to develop this group on Chase creek, near the old Longfellow mine. The officers and directors of the company are as follows: A. B. Boyles, president; N. L. Lewis, vice-president; Otto Rosenthall, secretary; C. P. Dunn, treasurer. The directors include the officers and B. B. Adams.

Standard Consolidated Copper Co. — This company has been incorporated under the laws of Maine, with a capitalization of $1,500,000, 150,000 shares, par value $10 each, for the purpose of consolidating the Coronado Mining Co., the Standard Copper mines and San Jose mines. The Standard Consolidated owns entire control of the San Jose properties and has the majority control of both the other companies. The Coronado Mining Co.'s shareholders have the privilege of exchanging their stock at the rate of 2.5 shares of Coronado for one of Standard Consolidated, and the Standard copper mines shareholders of exchanging five shares of Standard copper mines for one of Standard Consolidated. All the properties are near Clifton. The following are the officers and directors of the Standard Consolidated: C. A. Ross, president; George C. Gill, vice-president; J. W. Hazen, treasurer, and John K. Erskine, Jr., secretary. These, with E. A. Carter, are the directors of the company, and with the exception of C. A. Ross, are identified with the Shannon Copper Co. Mr. Ross, of London, England, was president of the Standard copper mines.

MOHAVE COUNTY.

A 10-stamp mill is to be built by C. T. Kennan near Signal. Only five stamps will be put in till a test run is made on the ores.

CALIFORNIA.

AMADOR COUNTY.

Climax.—This mine, formerly the Reed & Askey, at Wieland, is having a new 2-stamp mill put in.

Hardy.—The company owning this property near Plymouth has ordered $10,000 worth of new machinery and are putting the 20-stamp mill in good order. The mine is being re-opened.

Kennedy Mining Co.—At this property, Jackson, Webb Smith superintendent, the additional 20 stamps to the mill will soon be ready. The present milling capacity is 80 stamps.

South Eureka Mining Co.—About 20 men are working this mine at Suttercreek. The men struck recently.

South Springs Hill.—There is some prospect of this mine at Amador City starting again as its owner, Stillman F. Kelly, of Boston, Mass., is negotiating for its sale. The mine is equipped with hoist and mill and combines three claims on the mother lode.

Wildman Consolidated.—The collar of the Lincoln shaft at Suttercreek, John Ross Jr., manager, is being repaired. The Wildman and Mahoney mines are to be worked through this shaft which is comparatively new and in good shape.

CALAVERAS COUNTY.

I. B. Wollard, owning an asbestos property near Copperopolis is proposing a factory to utilize the product. Thus far most of the asbestos mined is of short fiber.

There were more locations of mining ground made last year than in any year of the history of the county. There are now about 4,000 claims on record.

Buckhorn.—At this group near Murphys, Geo. Stone manager, the vein has widened out with favorable indications.

Emma.—At this mine near Valley Spring 20 men are at work and the shaft has reached 460 ft. The old Berdena mill and machinery from Campo Seco has been secured for this mine.

Gum Boot.—It is reported that a new company is to take hold of this old mine on Indian creek near Murphy's. Recent work has shown it can be made profitable.

Lamphear.—At this mine near Mokelumne hill a contract has been let for a hoist for a new vertical shaft which is to be sunk to 1,000 ft.

Mountain King.—It is reported that this mine at Hodson has been bought by San Francisco men.

Shaw.—This property on Domino is to be developed shortly.

DEL NORTE COUNTY.

Sanger.—This copper group has recently been purchased by the National Mining Co. of Tacoma, Wash., and a crew of men set at work. The claims contain ledges of large size, some slightly developed. The company may construct a 500-ton smelter and build an electric road to connect the mines with the California and Oregon coast road to be built from Grant's Pass, Ore., to Eureka, Cal. The mines of the Waldo Smelting & Mining Co., near Waldo, Ore., are adjacent to the Sanger group so that two smelters will be practically in the same district.

EL DORADO COUNTY.

The new Bleichert tramway from the quarry to the Coloma terminal is nearly three miles long and carries 85 cars which discharge in 32 minutes. The line crosses the American river at an elevation of 600 ft., with a 2,400-ft. span. The quarry is now employing 85 men. The 10 dressing machines will manufacture 3,000 squares of slate per month. In 1903 the quarry produced 10,000 squares of slate and this year 25,000 squares will be made.

Gopher-Boulder and Delmatia.—It is reported that W. A. Bell will soon start work on these idle properties.

Havilah.—This mine at Nashville has a ledge of $6 rock on the 800-ft. level.

Ida Mitchell.—A large engine has been shipped to this mine near Placerville. The shaft is to be continued to the 1,000-ft. level.

Jasper Consolidated.—This claim at Green Valley has been bought by Superintendent Bluett for the Pyramid Mining Company.

Neptune and Garfield.—These two promising claims near Josephine are to be developed by E. W. Chapman and others.

Rio Vista.—Rich copper ore has been struck in this property near Fairplay.

Smith Point.—This claim, an extension of the Zantgraf mine, is being opened by A. N. Buchanan.

NEVADA COUNTY.

Bullion Mining Co.—This company, Geo. Mainhart manager, is about to re-open a mine south of the Bullion, which has yielded very rich ore. The shaft is to be pumped out and a new hoisting and pumping plant erected.

Central Consolidated.—Superintendent Coflin is prosecuting development work vigorously and a large force of men will be put on when the mill starts. A new boarding house has just been completed.

Champion Mining Co.—Since work began on some of the claims at Nevada City, 40 stamps have been running on ore with satisfactory results.

Cold Spring.—Development work is to begin at once on this mine recently bonded by an eastern company. The property has been idle for 20 years. It adjoins the Harmony gravel mine on Washington ridge.

Eagle Bird.—On this mine at Washington, idle some years, operations are shortly to be resumed.

Ethel.—At this mine, on Gaston Ridge, new machinery will soon be put in. Some underground work is being done this winter.

Ironclad.—At this mine near Rough and Ready the mill is ready to start and men will then be set at work stoping out the ore, some of which is exceptionally rich.

PLACER COUNTY.

Jupiter.—This gravel mine at Iowa hill, H. F. Calenberg superintendent, is now one of the best small properties in the county, paying good dividends.

South Yuba Water Co.—This company has recently leased the following ditches and canals in this county for 10 years: The two old Canyon creek ditches which empty into the Alta reservoir; the upper Bear river ditch which diverts water from Little Bear river and empties into Canyon creek; the Shady Run ditch and reservoir, and the lower Canyon creek ditch which conducts water into Gold Run district.

SAN DIEGO COUNTY.

Julian Consolidated Mining Co.—This company is keeping a 10-stamp mill running on ore from the High Peak claim and sinking a 500-ft. shaft on the Helvetia.

Little Giant.—Some very rich ore is being taken from this mine at Boulder creek, 12 miles from Julian. The pay streak is from 12 to 18 in. wide.

Moyer-Klein Co.—This company owning claims on Boulder creek is arranging to put in a 3-stamp mill and concentrator.

Owens.—This mine at Julian has not been sold though negotiations are pending. The main workings are at a depth of 450 ft.

SHASTA COUNTY.

Afterthought.—At this copper mine at Ingot, owned by the Great Western Gold Co., a steam air compressor plant is being put in and a smelter erected.

De Lamar.—Furnace No. 2 of this company was blown in January 2 and will double the present capacity of the works. The new concentrator is about completed. A body of rich copper ore was recently found on the 670-ft. level.

Gladstone.—This mine at French gulch, owned by the Hazel Mining Co., J. O. Jillson manager, has been closed some months owing to a miners' strike. The mill has been rebuilt.

Great Western Gold Co.—This company has obtained an injunction against R. Polkingham from performing any work on one of the Afterthought group of claims. He asserts one of the claims is his.

Redding Gold & Copper Mining Co.—This company is to erect a small smelter at its property near Igo.

SIERRA COUNTY.

Oriental.—A good vein has been cut in this tunnel near Allegheny, M. W. Mather superintendent, 3,330 ft. from the mouth. The Oriental ledge will be struck at a depth of 800 ft. The tunnel has been expensive, although no timber had to be used.

TUOLUMNE COUNTY.

Confidence.—This mine at Confidence has not been closed indefinitely, but a small force is at work. A new ore body is being developed.

Del Monte.—Extensive drifting is going on east and west from the 200-ft. level in this mine. The hoist will soon be in operation and the mill is nearly finished.

Don Pedro.—In this mine there is a vein varying from 2 to 12 ft., carrying values of about $11 per ton.

Eagle Shawmut Mining Co.—This property at Chinese camp owned by John Rosenfeld's Sons of San Francisco will shortly have a large storage reservoir for water for power. A 40-ft. dam is to be built.

Golden South.—This mine, at Ball Rock, near Confidence, has been bonded by H. B. Stewart and T. F. McGovern.

Golden West.—Arrangements are being made to reopen this mine on the old Comstock ranch.

Jumper.—Twenty stamps are being added to the mill at this mine at Stent, Mark B. Kerr superintendent.

Lamphear.—This mine at Confidence is to be reopened under direction of Richard Chute.

Mack.—A new vein of good value has been struck.

Mann.—The judgment in the case of Mann vs. Mann has been affirmed by the Supreme Court. The property consists of 143 acres near Quartz, supposed to be very valuable. By the decision the title is vested in Mrs. Catherine Mann and Mrs. Durgan.

Old Tuolumne.—This mine near Columbia is being worked again. There are two tunnels on the mine, one 1,700 and the other 600 ft. in length. There is also a 5-stamp mill.

VENTURA COUNTY.

There are three quartz mills in this county and mines are being worked at Piro and Lockwook creeks. The Frazer 10-stamp mill has been replaced by one of 20 stamps. Dry washing placer mining is going on in several parts of the county, the men earning about $2 per day.

COLORADO.

CLEAR CREEK COUNTY.

Consolidated Gem.—The upraise from the Newhouse tunnel working was successfully connected with the upper workings December 27. The upraise was begun in December, 1902, 125 ft. from the Newhouse tunnel, from which a lateral had been run from the Newhouse, starting 7,700 ft. from the portal. After it was started the lateral was continued until it is now 1,500 ft. from the starting point in the tunnel. It is 6 by 10 ft., and will, when completed, be a two-compartment affair. One will be utilized as an ore shoot, and will be lined with 3-in. plank, on top of which will be placed 30-lb. T-rails, with which the shoot will be completely lined, from the fourth level to the Newhouse lateral. This will require at least 175 tons of steel. The project was originated by W. E. Renshaw, manager, and has been mostly under the supervision of D. W. Carr, foreman of the Gem properties. When the upraise is in shape to operate, the 800-ton concentrator, it is stated, will be erected just east of the mouth of the Newhouse tunnel, where the ore can be dumped directly from the mine cars.

Indiana Gold & Silver Mining Co.—Work is being pushed on the Indiana tunnel on McClellan mountain, near Georgetown, and another tunnel will be started in the spring farther down the mountain to cut the veins at greater depth.

Mendota.—This mill, under the management of Stevens & McGarth, treated during 1903 about 20,000 tons of ore from the old dump, with a portion from the old stopes in the Mendota mines. The ore is concentrated on an average of about nine to one.

GILPIN COUNTY.

(*From Our Special Correspondent.*)

Alger-Kansas.—At this property on Quartz hill the machinery and building is being overhauled. The shaft is over 400 ft. deep and will have to be repaired. W. C. Carnegie, Central City, is manager.

Cleveland.—In this property, east of Black Hawk, silver ore in the main tunnel gives values of 360 oz. to the ton.

Federal Mines Co.—Sinking is being carried on at the Federal shaft which has reached 150 ft. and shows a nice crevice of concentrating ores with some yellow and gray copper ores carrying above the average values. The company recently installed machinery, erected top-buildings and sub-let a number of blocks of ground in the Rocky Sharpe. R. Hughes, Russell Gulch, is manager.

Fostoria Gold Mining Co.—The last payment of the purchase price of $250,000 was made this week on the group of 17 claims on the Hall ranch and a group of 18 claims adjoining.

James Henry.—This property on Gunnell hill will soon be operating as machinery is installed and the top buildings overhauled. The property was among the best of the early producers, and is being financed by the Benzie Investment Co., with W. Ballantyne, Central City, as manager.

Jenny Creek Mining & Milling Co.—This company has let a contract for 400 ft. of tunnel work on its group in the Jenny creek section of the Kansas district. The tunnel is to gain depth and dispose of the surface water. Ores have been shipped which carried better than the average values and the company figures on its own mill during 1904. B. F. Pyle, Baltimore, Colo., is manager, and the company has offices in Majestic building, Denver.

Notaway Mining Co.—Chicago parties interested in the West Notaway group of claims have erected a new shaft building and installed machinery to replace that destroyed by fire about two months ago. The company has a large group of claims including the Alva Adams, acquired recently, is figuring on a new shaft in the center of Russell gulch, and will erect top-buildings and install a large plant of machinery for deep work. J. F. Hopkins, Central City, is manager.

Sampson.—This property in South Boulder district near Rollinsville, has been leased and bonded. The main shaft is down 60 ft. John Peterson, Baltimore, will be in charge.

Success-Meeker.—This group in Lake district has been acquired by the Torrey Exploration Co., of Colorado Springs. It has produced considerable medium grade ores of a concentrating and smelting character. Machinery is being installed. John C. Fleschhutz, Central City, is manager.

LAKE COUNTY—LEADVILLE.

(*From Our Special Correspondent.*)

The production averages about 2,300 tons daily of all classes of material.

A. Y. & Minnie.—From 80 to 90 tons daily of milling ore goes to the Minnie mill, while 2,000 tons of crude ore per month goes to the smelters.

Bartlett.—The up-raise from the new 1,300-ft. tunnel has cut the old ore shoot.

Benton Mining Co.—The strike in the Park shaft, the most westerly find on the gold belt shows up well. The ore is supposed to be an extension of the old Penn ore shoots and carries from 1 to 5 oz. gold. Shipments are regular under the direction of John McAllister.

Fryer Hill Mines Co.—Preparations are being made to sink the new Harvard shaft 400-ft. and bids have been called for. At 400 ft. a fine plant of machinery will be put in and the ore shown by a drill hole years ago in another part of the workings will be opened through the new shaft.

Keystone Mining Co.—It is stated that Pittsburg people are to raise $50,000 to develop the Rex. They have a large plant of machinery on the ground and the money is to be used in taking out the water and developing the ground after settling the present indebtedness.

Midas Mining Co.—250 tons daily are being mined through the Coronado and Midas shafts. The water is handled through the Coronado pumps, about 850 gal. per minute.

Nisi Prius.—Local lessees are sinking a new shaft from the surface after a rich ore body.

Ohio & Colorado Smelting & Refining Co.—Besides all the lead and matte furnaces the 12 new roasters are in operation and are said to give satisfaction.

Western Mining Co.—120 tons are being shipped daily to the mill, most of the material coming through the Adams shaft. A large tonnage of low grade material is also handled through the crushers. The company has erected a new surface plant at the old Henriett shaft which has been idle for several years and will operate on a large scale on the low grade carbonates exposed in the Henriett workings.

SAN MIGUEL COUNTY.

(*From Our Special Correspondent.*)

There is every reason for believing that the tyrannical union that has caused much trouble for the past three years is about broken. Part of its leaders were deported to Montrose, and they will not be allowed to return to Telluride until after the mines are all running at full capacity and the troops are withdrawn. The mills that were tied up by the strike last September are now either in full or partial operation. The Alta, with 20 stamps and concentrators: the Nellie, 20 stamps, and the Butterfly-Terrible, 30 stamps, are all in full operation, and each company is employing about 40 miners. The Tomboy, Smuggler-Union and Liberty Bell mills are in partial operation, and the managers expect to secure men enough to have the full mill equipments running before the end of January.

Tomboy Gold Mines Co.—The manager, Mr. John Herron, is in southern California, where he will spend several months endeavoring to regain his health, which was completely broken by the long strain following the strike. Before leaving he made the statement that 1904 would be the best year since the company has been working the ground in Savage basin. He contemplates adding 60 stamps to the present 60-stamp mill, making it one of the largest in operation in the State. The approximate work done during 1903 was: Drifting, 339 ft.; raises, 989 ft.; shafts, 98 ft.; cross-cuts, 12 ft.; total new work, 4,948 ft.; ore milled, 80,000 tons, which yielded an estimated output of $740,000; ounces gold bullion shipped, 39,180; tons concentrates shipped, 6,960; estimated cost mining, milling including all development expenses, $5.80 per ton of ore extracted and treated. No dividends were declared, but all profits realized were put into improvements For more than three months the property was tied up by the strike.

TELLER COUNTY—CRIPPLE CREEK.

(*From Our Special Correspondent.*)

Cripple Creek Drainage Tunnel.—The measurements for December by Engineer Jacquith shows that the water was lowered 10½ ft. during the month, making the water level 8,998 ft. above sea-level. When the water was tapped it was standing at 9,026 ft., or 15 ft. below the standard tunnel level. At the rate the water is receding, the Elkton Co. will begin work on the eighth level about May 1. The flow through the tunnel is about 5,200 gal. per minute. The total output of ore from all the Elkton properties for December was 4,700 tons.

Cripple Creek Enterprise Gold Mining Co.—This company will about January 15 resume sinking. The shaft is down 215 ft. and the intention is to make it 515 ft. deep. The property is well equipped with machinery.

Findley.—The foundation for the brick superstructure to replace the frame engine house recently burned, is under way. The new machinery is being received.

Last Dollar.—This Bull hill mine has a new sampling plant that means a considerable saving to the company; also a new washing machine. There are about 50 men now working in the mine, and the output is about 40 tons daily of 1½ oz. ore. About two years ago sinking stopped on account of water at a depth of 1,240 ft. Sinking will soon be resumed, as the water has fallen.

Le Clair Mining Co.—John Sharpe, Geo. L. Keener, T. E. Jones and David P. Wilder, held a meeting on December 30. A dividend of $17,500, or, 2⅜c. per share on all outstanding stock, was declared. Stockholders may receive their dividend by presenting their stock at the company's office in Cripple Creek. The company has about $1,500 remaining in its treasury for the development of its other holding, three acres of ground adjoining the Kitty Lane on Gibbon hill. The taking up of the bond of $17,500 by H. M. Gilbert and associates, furnished the money to pay the dividend. The Le Clair stock is scattered and some may have been lost.

Moon Anchor.—This company is steadily sinking the main shaft, and is down 865 ft., but will continue to the 1,000-ft. point, unless barred by water. An occasional shipment of average grade mill ore is made.

Peggy Gold Mining Co.—This is the new name for the Sunset claim of the Le Clair, containing a trifle less than ½ acre adjoining the Mary McKinney in Anaconda, leased to H. M. Gilbert, of Cripple Creek, and his associates about two years ago. From December, 1902, prospect work was carried on at intervals till January, 1903, when sinking was begun from the bottom of a 69-ft. shaft. At the 300-ft. level a vertical vein was encountered and from September 10 to 21 returns from ore shipped from this vein netted the company $1,350. On another vein stoping is being done, and an ore body 8 ft. wide is reported with small seams of sylvanite returning high values. Thirty men employed in two shifts are running four and five machine drills. From September 10 last to December 27 Gilbert & Co. paid about $5,000 in royalties, and took up the $12,500 bond on December 27. After January 15, sinking will be resumed.

IDAHO.

SHOSHONE COUNTY.

(*From Our Special Correspondent.*)

16 *to* 1.—A deal is on between Finch & Campbell and the Bernier interests for a settlement of the long litigation over this claim. Finch & Campbell are expected to acquire the property by paying cash to the Bernier faction .

Delta.—C. S. Crysler, who put three big dredges at work on Trail and Beaver creeks, last year, announces that he will start his Mascot

company dredge as soon as weather permits. It handles from 1,500 to 2,000 yards a day, and cost $50,000.

MISSOURI.

ST. FRANCOIS COUNTY.

(From Our Special Correspondent.)

Central Lead Co.—The strike ended in an agreement to settle by arbitration, the arbitration committee to consist of one member appointed by the miners, one member by the company, the third to be selected by the two. As the pump men went out, it will take about a month to unwater and start up the Central mine. As the miners' union would not even allow the removal of the mules, some 18 mules were left to drown, and all because the company discharged a man who refused to do his usual work.

The American Geological Society, after its St. Louis meeting, made a two-days' trip through the disseminated lead region, and then went to the Joplin mine district, where it spent one day in examining the mines and other interesting features. The excursion was given by the Missouri Geological Survey under care of Dr. E. R. Buckley, the state geologist.

MONTANA.

BEAVERHEAD COUNTY.

Montana Gold Dredge Co.—The personal property of this company, on Grasshopper creek, was sold for $1,600 recently, to partly satisfy a judgment for $106,000 held against the company by Clarence A. Hand, of Colorado. It is rumored that as soon as the property is all sold the company will be reorganized.

BROADWATER COUNTY.

Toston Copper Co.—This company's mines, 14 miles west of Toston, are being unwatered, preparatory to further development. The company is capitalized at $1,250,000, with the following officers: President, David J. Charles; vice-president, Emil H. Renisch; treasurer, T. J. Bennetts; secretary, John A. Shelton; manager, W. K. Edwards, all of Butte.

FLATHEAD COUNTY.

Snowshoe.—The mill on this property, near Libby, operated by the Rustler Mining & Milling Co., is expected to run until February 1. Nearly 2,250 tons of concentrates, averaging about $60 per ton, are reported turned out the past season. Additional tables, more sliming capacity and a Huntington mill are to be added in the spring. W. W. Wright is president.

GRANITE COUNTY.

Gold Reef Mining Co.—Five men are employed at this property and the mill is handling from 4 to 6 tons per day, the ore averaging about $20 per ton.

Milwaukee Extraction Co.—Machinery is arriving for these properties, at Red Lion, including a Chilean mill, crushers, rolls and tanks, for a 100-ton cyanide mill. Much ore is said to be in sight that is said to average $7 per ton.

Willow Creek Mining Co.—The machinery being erected by this company, near Philipsburg, is on hand, and the mill is expected to be completed early in the spring. Operations continue through the winter. Ore recently opened is said to average $25 in gold per ton.

NEVADA.

NYE COUNTY.

(From Our Special Correspondent.)

Tonopah Mining Co.—This company has stopped further development of its mines until the completion of the railroad. The decision affected about 50 men. A small number will be employed taking out ore, as the usual shipments will be continued. The main working shaft on the Mizpah claim is down nearly 1,000 ft, but the mine has not been developed below the 600-ft. level; in all about 18,000 ft. of development work have been done, of which 13,000 ft. are in ore. Since the mine was discovered in May, 1900, there has been shipped $5,576,000 worth of ore of an average value of $160 per ton. Of this amount over $3,000,000 worth were shipped by the present company, the remainder having been previously shipped by leasers. The company has never paid a dividend.

Tonopah Railway.—The contract for construction has been let. It calls for the completion of the road by May 1. Rails, ties and other equipment have been purchased and are now on the way. Through rates have been arranged with the Southern Pacific Railway to the smelters at San Francisco and Salt Lake.

PENNSYLVANIA.

ANTHRACITE COAL.

All collieries that closed for the holidays resumed work as planned on January 4.

Shamokin Coal Co.—On January 7 this company announced that the Natalie colliery, employing 800 men and boys, would resume work in a few days, after an idleness of two months, caused by litigation among stockholders.

BITUMINOUS COAL.

A. C. Frick Coke Co.—Orders were issued by this company, at Scottdale, for the firing of over 1,500 additional coke ovens.

BERKS COUNTY.

Rittenhouse.—These iron ore mines, near Hereford, have resumed work after an idleness of a month, giving employment to over 100 persons.

SOUTH DAKOTA.

CUSTER COUNTY.

(From Our Special Correspondent.)

Clara Belle Co.—The shaft is 280 ft. deep and the ore seven ft. wide. The company is considering means of treating it. A good extraction was made with amalgamation the last mill run, but the ore is becoming more refractory with depth.

Extreme Gold Mining Co.—The new mill is complete and ready to run. Amalgamation is the process, but it is expected concentration will have to be added to save the values.

Granz Gold Mining Co.—It is said work will be resumed on this property early in the spring.

LAWRENCE COUNTY.

(From Our Special Correspondent.)

Big Four Mining Co.—The shaft house, hoisting plant, air compressor and other machinery have been destroyed by fire. The loss to the company was over $12.000, on which there was $3,000 insurance. The shaft is 170 ft. deep.

Clover Leaf Mining Co.—Forty stamps are in constant operation and good monthly clean-ups are made.

Dakota Mining & Milling Co.—The cyanide plant is reported giving satisfaction. John Ferrall has succeeded J. H. Lucy as mine superintendent.

Deadwood-Standard Gold Mining Co.—The dividend for January has been passed. The property is under option to the Spearfish Gold Mining & Reduction Co. During the last few weeks the company has had some difficulty in getting ore from the mine to the mill, owing to the deep snow.

Ruby Gold Mining & Milling Co.—The six new Merrall stamp mills are in position and the company will be milling ore before the close of January. It is the intention to put in a Chilean mill.

PENNINGTON COUNTY.

(From Our Special Correspondent.)

Black Hills Copper Co.—The shaft has been unwatered after a two weeks' task and drifting resumed in the easterly crosscut.

Burlington Gold Mining Co.—The shaft is nearly 100 ft. deep and the ore widening.

Colombia Gold Mining & Milling Co.—This company has been reorganized and most of the promotion stock has been distributed among shareholders at 5c. a share.

UTAH.

BEAVER COUNTY.

(From Our Special Correspondent.)

Copper Mountain Mining & Milling Co.—A winze is being sunk on a 10-ft. vein of good copper ore.

JUAB COUNTY.

(From Our Special Correspondent.)

Uncle Sam Consolidated.—This concentrating plant has made its first shipment of concentrates.

Yankee Consolidated.—Secretary Amsden announces that the production of the mine during 1903 was of 7,600 dry tons of ore, which produced 3,865,827 lb. of lead and 157,615 oz. of silver and gold.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Park City Shipments.—The output for the week ending January 8 was 6,180,780 lb., as follows: Daly-West, 2,953,000; Silver King, 2,993,780; Keith-Kearns, 181,000; Creole, 30,000; Barnes Bros., 23,000.

Bingham Consolidated Smelter.—Copper bullion shipments for the week ending January 8 amounted to about 240,000 lb.

Columbus Consolidated.—The annual meeting of the stockholders resulted in the election of the old directors, with one exception, W. B. Jeffs, of Rockland, Mich., succeeding his brother, L. A. Jeffs. The officers are Tony Jacobson, president; Clarence K. McCornick, vice-president; Arthur E. Snow, secretary and treasurer, all of Salt Lake City. During 1903 the receipts from all sources were $98,809. The sales of ore amounted to $28,829, and sales of treasury stock $67,254. The company will build a concentrator of 150 tons daily capacity during the present year. The new electric power plant, erected at a cost of $40,000, will be ready about March 1.

Ohio Copper Co.—Drifting is in progress from the 117-ft. level of the winze from the Cunningham tunnel, in shipping ore.

United States Smelter.—Shipments of copper bullion for the week ending January 8 aggregated 181,000 lb.

Utah Consolidated Smelter.—The foundations for the new additions to this plant are completed, and work on the structural parts will start soon. Shipments of copper bullion for the week ending January 8 amounted to approximately 300,000 lb.

TOOELE COUNTY.

(From Our Special Correspondent.)

Honerine Mill.—This new plant will be ready in about 30 days. The equipment has arrived and is being rapidly installed. The Honerine tunnel is in 5,800 ft.

Sacramento Gold Mining Co.—At the annual meeting held recently in Salt Lake City the following officers were chosen: President and general manager, Glen R. Bothwell; vice-president and treasurer, R. E. McConaughy; secretary, F. E. Losee, who, with John A. Houghton and G. S. Hanna, constitute the board of directors. During 1903 sales of gold cyanides realized $115,122, and retorted quicksilver $16,423. The cash on hand December 31 was $12,607. Dividends in 1903 amounted to $60,000. The dividend for this January was passed.

WASHINGTON.

FERRY COUNTY—REPUBLIC.

(From Our Special Correspondent.)

While the smelters allow 95% of the gold and silver in ores shipped to them, the freight and treatment charges amount from $5.10 to $6.50 per ton, with, in some cases, wagon haulage.

Golden Eagle.—The shaft is down 250 ft. Eight men are employed on one shift.

Nob Hill.—The trestle, chute, ore bin and road grade to the latter are completed.

Mountain Lion.—Dr. W. A. Hendryx recently directed alterations in the mill for the introduction of his agitator and process. A dynamo and electrical equipment are in transit. The agitating tank, of redwood, is 16 ft. in diameter, 9 ft. deep to the top of the conical bottom, which has a slope of 45°. Dr. Hendryx does not promise to exceed 40 tons to a charge, and thinks that the ore will require only 6 hours for treatment, with an extraction of 80%. The ore will be crushed to 80-mesh, going from a

20-stamp battery to four Huntington mills. The pulp and battery water will run into a series of 5 storage tanks and thence fed into the agitator. The charge in proportion will be 1 lb. of cyanide and 1½ tons of water to 1 ton of ore.

Zala M.—Four men are employed assorting ore and, the snow roads being good, teams have started hauling to the Sheridan siding, on the Republic & Kettle River railway. Work in the mine has been temporarily suspended. There are about 150 tons of ore broken in the mine.

OKANOGAN COUNTY.

(*From Our Special Correspondent.*)

Bodie.—The mine is closed down. Mill construction has stopped for the winter and all the men but a watchman are discharged.

Ruby.—A shipment of 30 tons of ore that is said to have netted $165 per ton at the smelter passed through Republic recently.

SNOHOMISH COUNTY.

Everett.—This smelter and the Monte Cristo concentrator are reported closed by the American Smelting & Refining Co., which recently purchased them from John D. Rockefeller. The Everett smelter was purchasing large quantities of British Columbia and Idaho ores, which otherwise go to Omaha and other eastern smelters.

FOREIGN MINING NEWS.

CANADA.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Boundary Ore Shipments.—For the week ending December 26 shipments amounted to 15,933 tons, as follows: Granby, 12,500; Mother Lode, 1,856; Emma, 750; Oro Denoro, 428; Athelstan, 300; Senator, 99; total for the year to date, 671,989 tons.

BRITISH COLUMBIA—ROSSLAND DISTRICT.

Rossland Ore Shipments.—For the week ending December 26 shipments aggregated 7,985 tons, as follows: Le Roi, 3,836; Centre Star, 1,280; War Eagle, 1,080; Le Roi No. 2, 410; Le Roi No. 2 (milled), 250; Jumbo, 280; Spitzee, 30; I. X. L. (milled), 100; Kootenay, 319; total for the year to date, 403,260 tons.

NOVA SCOTIA—CAPE BRETON.

Dominion Coal Co.—The output of the company's mines in December was 256,383 tons, compared with 266,332 tons in December, 1902. The total output for 1903 was 3,147,770 tons and for 1902, 266,332 tons. The total shipments in 1903 were 2,801,344 tons.

Nova Scotia Steel & Coal Co.—The total output of the collieries of this company for 1903 was 447,218 tons, as follows: Sydney No. 1, 255,714; Sydney No. 2, 112,749; Sydney No. 3, 78,755. The increase over last year is 188,773 tons.

Reserve.—The output at this colliery for 1903 was 828,537 tons, which is said to beat the record for the world of any colliery.

NEW ZEALAND.

(*From Our Special Correspondent.*)

Thames District.—Very little work is now being done. The Waiotahi, a small mine, which has paid dividends for some 30 years, is still plodding along, and a little gold is won by tributers, but the field is practically worked out to the 500-ft. level, and hopes are now centered on the results of the diamond drill boreholes.

Waihi.—The splendid returns from the Waihi mine speak for themselves. There is an abundant supply of ore developed, sufficient to keep the mills going for many years. The Grand Junction mine has lately come into prominence, principally owing to the splendid lode struck by the bore-hole from the 500-ft. level. It is believed by the management that the rich shoot of mineralized ore in the eastern end of the Waihi mine will ultimately enter the Grand Junction. In the latter mine the drive along No. 2 reef at the 500-ft. level is in first-class ore.

MINING STOCKS.

(Full quotations given on pages 104 and 105.)

New York, Jan. 12.

Notwithstanding war rumors, the stock market, both here and in London, shows strength, and, with money easy, speculation is likely to increase.

The passing of the United States Steel common dividend established a new low record at $9.625 on January 6, while the preferred, receiving 1.75%, brought $54.625. Since then both shares have improved in value. On January 1 the Steel Corporation made its first special dividend payment of $5 on the 48,983 preferred shares held by the 27,379 employes, who made their purchases about a year ago at $82.50. This bonus will be continued for five years, according to the original agreement, and a proposal has now been made whereby the old subscribers can buy more stock at the reduced rate of $55.

Amalgamated Copper has been the most active stock on 'change in volume of business, owing to inside support, and to an extent to the adverse interlocutory decision in the Butte & Boston litigation. The stock advanced from $48.50 to $51.375, but at the close on January 12 reacted to $49.50. Anaconda was sympathetically stronger, advancing 3.5 points to $19. Greene Consolidated, of Mexico, anticipating an issue of $2,800,000 in 6% 15-year bonds, convertible into stock at par ($10) and subject to call after two years at 110, showed heavy transactions at receding prices. On January 6 the stock broke from $13 to $11.50, and later rose again to $13.75, selling a fraction off at the close, on January 12. Tennessee was firm, rising to $32 on declaration of the second semi-annual dividend of 5%. White Knob, of Idaho, did a little business at $8@$9; British Columbia at $2.50@$2.785, and United, of Montana, at $6@$5.875.

The Comstock shares are trying to repeat their high prices of a year ago. Consolidated California & Virginia took a jump from $1.50 to $3.20, Caledonia from 98c. to $1.50, and the others in proportion. The better feeling has come from an improved showing in the Ophir mine.

In the Colorado list there is little animation. Portland, of Cripple Creek, though it pays an extra dividend this month, moved up only 5c. to $1.45, and Elkton, after touching 47c., went back to 45c. A sale of Small Hopes, of Leadville, is noted at 30c. per share.

Boston. Jan. 12.

(*From Our Special Correspondent.*)

The new year brings a better tone to copper stocks, and an increase is noted in the buying orders. At times there is apparently no manipulation or attempt to bid prices up, and, withal, there is a much better feeling. Sentiment, however, is conservative and no pronounced movement is looked for. Market movements here follow Amalgamated to an extent, although the higher-priced stocks act independently at times. This has been particularly notable in the cases of Tamarack, Quincy, Calumet & Hecla and Osceola. The trading in Copper Range Consolidated has toned down considerably, due to the stock exchange governors taking action some time ago relative to matched orders, or washed sales.

Utah Consolidated still continues to be the most popular stock, and has sold as high as $33.37¼, closing to-night at fraction below. There are over 2,500 shareholders in this company, and as $3 is being paid per annum the present price seems inviting. It is said that large New York holdings of a copper firm have been transferred over to 26 Broadway just below the current price. Copper Range has been traded in between $45@$46.50. Centennial was bid up $1.75 to $17.25. The talk of an assessment on this stock is said to be premature, although it is allowed that money will be needed to build and equip a mill. Tamarack took a $11 jump to $111, although it has lost $4 of it by selling ex-dividend. One thing in the company's favor is that there are but 60,000 shares outstanding. Osceola sold from $62 to $60, and closed to-night at the latter price, being ex-dividend. Shannon has been active and continued selling pressure forced the price down to $7.25, with partial recovery.

Old Dominion has been very quiet, selling at from $11 to $10. The company's affairs are still in a mixed way. The company has been refused the contemplated merger by the New Jersey courts and is now going to try it over again under Maine laws. The opposition will carry the fight into that State also. Some 100,000 shares have been deposited under the latest plan. These assenting receipts have been placed in the unlisted department. The Old Dominion's December output was 1,000,000 lb. copper. The mine had the benefit of some United Globe sulphide ores at a cost of $1 per ton.

Calumet & Hecla is selling at from $437 to $442, and holds firm. Mohawk is selling between $37.75 and $38.50, with little doing in it. Quincy is up $5, to $100. United States mining is being quietly absorbed and touched $19.50. The latter company earned $103,000 net during November and of this spent $17,000 for improvements. A fifth furnace is likely to be placed in commission.

Daly West has settled from $36 to $34.37½, the latter price being ex-dividend. Wolverine holds steady, close to $70. Victoria is selling at $3.50@3.75, assessment paid. A noteworthy feature was the sale of United Copper stock at $4 per share in this market Dec. 30. Bingham is off to $22 per share.

Colorado Springs. Jan. 8.

(*From Our Special Correspondent.*)

The beginning of the new year finds the mining stock market in much better shape than for some months past, with good indications for a continuation of the advance in price of mining securites, which began about 30 days ago. General conditions in the Cripple Creek district are all that could be desired. The prospect for the early opening of the Stratton properties to lessees is already having a beneficial effect; the drainage tunnel is gradually unwatering the big producers; the geological survey assures more activity in the outlying sections of the camp, which, all taken together, will undoubtedly enhance the demand for mining stocks, and higher prices will be the consequence. The directors of the Portland Co. this week announced that the regular quarterly dividend of 3c. per share would this quarter be doubled, making a disbursement of $180,000. The anonuncement has had a good effect on the stock, the selling price reaching $1.40 per share to-day, the highest point for many months. No news is being given out relative to the progress of negotiations for the sale of the Stratton properties.

The market has been strong all week, and trading good. Elkton advanced from 47 to 49½c.; C. K. & N. declined from 15 to 14c. El Paso was a feature of the trading, a quantity of the stock changing hands at prices advancing from 56½ to 58¼c. Gold Dollar was strong at 3½, Moon Anchor at 10, and Work at 4⅝c. per share.

Salt Lake City. Jan. 9.

(*From Our Special Correspondent.*)

During the week ending January 9, the sales made on the floor of the Sale Lake Stock & Mining Exchange amounted to 138,279 shares, which sold for $59,431.

With few exceptions, stocks have been weak and the demand small. Sacramento closed higher, on the strength of the announcement of the company that dividends would be resumed in February. Century also advanced from 78½c., closing strong at 91c. Butler-Liberal also stiffened a few points. Consolidated Mercur continues weak, with little hope of any radical changes for the better. Mechanical difficulties have interfered with the successful operation of the re-arranged mill. Park City stocks found as ready demand as any during the week. Daly-Judge received support and rose to $4, afterwards relaxing, closing the week 45c. lower. Considerable trading was done in Ingot, belonging the camp of Mercur, but at lower figures.

The completion of the new concentrating mill at the Uncle Sam Consolidated, Tintic district, created local demand, and over 10,000 shares were transferred. Yankee Consolidated was inactive.

San Francisco. Jan. 6.

(From Our Special Correspondent.)

The mining stock market, which is usually quiet after the holidays, had a fair degree of excitement in a sudden spurt in Ophir on reported good news from the mine. The stock went up rapidly, and reached $4.25 on Tuesday, but after that there was some reaction, and the price fell to $3.45. In its upward turn this carried a good many of the Comstocks with it, making better prices than have been shown for some time. They also followed it in the reaction and were rather weaker at the close.

Some quotations noted, outside of Ophir, were: Best & Belcher, $2.25; Mexican, $1.90; Consolidated California & Virginia, $1.50; Sierra Nevada, 75c.; Savage, 55@60c.; Gould & Curry, 47c.; Potosi, 24c. per share.

On the San Francisco & Tonopah exchange business was not very active, in the absence of any special stimulus to the market. There was a small falling off in prices, which affected nearly the whole uist. Tonopah Belmont brought 70c.; Tonopah Midway, 44c.; Tonopah North Star, 33c.; Gold Anchor, 25c. per share.

On the California exchange business was quiet, and buying orders were not plentiful. Home Oil sold at $1.10; Toltec, 20c.; Occidental, 17c.; California Standard, 10c. The monthly record of sales on the California Stock & Oil exchange for 1903 is as follows:

	Shares.	Value.
January	267,019	$255,202
February	322,445	219,358
March	190,908	151,982
April	236,268	115,571
May	401,454	154,386
June	154,720	117,928
July	74,594	71,890
August	181,478	119,231
September	113,019	69,046
October	73,460	30,322
November	69,067	24,703
December	82,452	41,700
Totals	2,166,884	$1,371,319

Business in December showed a slight improvement over October and November, but was still less than one-third of that reported for some of the earlier months of the year.

COAL TRADE REVIEW.

New York, Jan. 13.

ANTHRACITE.

The anthracite trade shows material improvement all over the country. Cold weather has compelled consumers to make large inroads on supplies laid in during the summer, and in many cases has sent them into the market for more coal. The activity that has prevailed in the retail trade for several weeks has now affected the wholesale trade, and sales agents are receiving orders for prompt delivery. The outlook is that buying will be active during the balance of this month and through February and March. Those mines which closed during the holidays are again in operation, and the output for January will undoubtedly show a large increase over December. The shut-down caused some shortages of certain sizes and grades of special coals at some points. Railroad shipments that were somewhat hindered by snow are now moving freely. Coastwise shipments have been obstructed by ice and by high winds.

In Lake Superior territory business is pretty brisk, and the movement of coal from docks is active. In Chicago territory wholesale buying has improved, there being a good demand from out of town yards. Along the lower lakes and in Canadian territory improvement is also noted. In the line trade at eastern points and in the seaboard trade buying has been more active than at any time this winter. This applies particularly to points other than New York: at this place, as has been noted, trade was good during the whole of December. Ice in New York harbor has made it difficult for vessels to take cargoes at the docks, and vessel captains have not cared to take chances. The high winds along the coast have kept vessels at anchor. The steam sizes have felt the weather conditions, and the demand for them is much better than it was. Buckwheat size, in particular, has been in short supply; now that the collieries have resumed work the supply is more liberal. There is no prospect of any change in prices before spring. Quotations remain, f. o. b. New York harbor shipping port, as follows: Broken, $4.75; stove, egg and chestnut, $5; pea, $3; buckwheat No. 1, $2.50; rice, $1.60.

BITUMINOUS.

The Atlantic soft bituminous trade is quieter than it was last week. Coal mined since January 1 is arriving at the shipping ports in sufficient quantity to supply all needs. The only serious difficulty that confronts the trade is the slow transportation by water, due to the cold weather and storms. The Delaware and Chesapeake bays have been practically closed by ice, and shipments at New York harbor have been much impeded. A number of boats have been sunk by ice and vessel captains have been apparently afraid to move. High winds along the coast have also delayed transportation, even tow barges being held in port for two or three days at a time by gales.

The trade is already beginning to talk of business for the new year, but nothing definite as yet has been done, and it is likely that little will be done until there has been a general meeting of the trade to discuss conditions. Prices are a little stiffer than they were, producers of the ordinary grades of Clearfield holding for $2.60, f. o. b. New York harbor shipping port, and producers of the better grades for $2.75@$3.

In the far East the market is quiet, as that territory has been receiving plenty of coal from Chesapeake bay ports. Along Long Island sound there is a demand for a fair tonnage: deliveries have been hindered of late by the weather. At New York harbor points trade is quiet. The all-rail trade is active, and at some points demand has improved.

Transportation from the mines to tidewater is fairly good. Car supply at the mines is up to all demands of producers. In the coastwise vessel market vessels are in fair supply, but captains hesitate to take charters on account of weather conditions. We quote current rates from Philadelphia as follows: Providence, New Bedford and Long Island sound, 65c.; Boston, Salem and Portland, 75c.; Portsmouth, 80c. From New York harbor rates are 55c. to sound points and 60@65c. to points beyond Cape Cod.

Birmingham. Jan. 11.

(From Our Special Correspondent.)

There is a steady and heavy production of coal in Alabama right now. The shipments, both by water and rail, from this section into Louisiana amount to something like 5,000 tons a day. This is caused by the frozen condition of rivers north of Ohio, preventing the regular shipments of Pennsylvania coal into that market. The Pennsylvania product is generally used in Louisiana, but the river conditions have been such that there could be no coal moved for several weeks.

State Mine Inspector J. M. Gray is receiving reports now as to the output during the past year. Some of the larger mines report a falling off in the quantity of coal produced last year as compared with 1902, but there have been a number of new mines opened. Inspector Gray anticipates a 12,000,000-ton production for the year. Reports kept of fatal accidents in coal mines in this State show that 57 men lost their lives during 1903 in Alabama. Four accidents took place during the year, in each of which four men were killed. Only one death was caused by gas explosion.

The coke situation remains unchanged. The production is healthy, and as long as there is a steady production of pig iron the coke production is going to be kept up.

Alabama will have about 20 delegates at the annual convention of the national organization of the United Mine Workers of America, which begins next Monday.

Many reports were current in this section recently again that large corporate interests of the north and east were anxious to procure coal lands in this district. Publication was given during the past week to rumors that negotiations were in progress for several thousand acres of coal lands in Alabama. These rumors cannot be verified.

Chicago. Jan. 11.

(From Our Special Correspondent.)

The wholesale trade in anthracite is in a very satisfactory condition; sales are largeand distributed over a wide territory. Winter has at last made an impression upon the large stocks laid in by retailers and consumers in Chicago territory, and henceforth, until the coming of spring, the leading houses look for large orders steadily placed. In all-rail territory the delays in transportation are serious, but not so bad as they were last year, and all-rail sales are steadily increasing. Dock territory has an abundant supply, but is ordering freely. Locally, the demand is as good as anybody could wish for, and sales have been substantially increased by the substitution of coal-heating plants for gas, due to the prospective failure of the natural gas supply from Indiana. There is some cutting of price on independent coal, but the great bulk of sales are at the standard price, $6.50 for stove and egg.

Of bituminous grades, Indiana and Illinois continue the chief sold, with prices about the same as for the last month. Cheap coal is sought by the consumer, and consequently western run-of-mine and screenings are popular, ranging $1 @$1.90. Western run-of-mine, $1.60@$2.35 Chicago, with lump at $1.75@$3, the latter price being for Carterville. Smokeless is being sold in better quantities than previously, bringing $3.40 @$3.65 for run-of-mine, and $4@$4.35—the higher prices being the circular ones—for lump and egg. Speaking generally, smokeless is being held closer to circular prices than formerly. Hocking is plentiful, but selling well, for $3.80 @$4. Youghiogheny and Pittsburg are somewhat weak, selling at $3@$3.25. There is too large a supply of gas coals for profitable sales, and shipments will have to be restricted to better the market for these. Transportation troubles are causing complaint, but the situation in this respect is not neary so bad as it was last winter.

Cleveland. Jan. 12.

(From Our Special Correspondent.)

The coal trade in this territory has strengthened considerably along all lines. The demand for steam coal has been good; the call for domestic coal has been splendid. The demand for slack has suddenly taken a spurt and has almost doubled the price within two weeks. Two or three weeks ago the price of slack was 50c. at the mines, with the material a drug on the market. Now there is a good demand for it, prices suddenly rising to 90 and 95c. at the mines.

The demand for coarse coal has also put those prices up a very little. Steam coal, run-of-mine, in the Pittsburg ditsrict, is now bringing about $1.25 at the mine and Ohio coal of the same grade is bringing amout $1.15. The call for this material has been improved by the increased activity in some of the factories in this territory. The call for domestic coal, of course, has increased with the colder weather, and the situation is strong, with prices on the up-grade. Coshocton coal is bringing about $2@$2.10, at the mine, and the Massillon coal, $2.75 at the mine.

The coke situation has also improved, the market being firm and steady. The demand, of course, is not equal to the supply, the active ovens and the good-car situation making that impossible in the present light demand. The prices, however, held firm and the market hardened during the snow storms. The prices hold at $2.25 to $2.65 for 72-hour coke of the best grade at the oven; while high-sulphur cokes are selling for about $2 to $2.15 at the oven.

Pittsburg. Jan. 12.

(From Our Special Correspondent.)

Coal.—The starting of a number of idle mills has increased the demand for coal, but prices have not shown any improvement. It is impossible to quote prices, as many sales are made at confidential figures. The low price of 90c. a ton for run-of-mine coal, at which a few sales were made last month, is not known to have been duplicated. One large sale was made yesterday at $1.05 at mine, and this is believed to be the bottom price for this month. The annual district convention of the United Mine Workers opened yesterday, and will be in session all week; the delegates to the national convention will leave for Indianapolis on Saturday night. From the sentiment of the miners present, a reduction in the rate for the scale year beginning

April 1 will not be accepted. Some of the delegates are advocating an advance to $1 a ton for coal mined over a 1¼-in. screen. The present rate for pick mining is 90c. a ton. An advance in the machine mining rate also is being urged.

Connellsville Coke.—Trade seems to be improving as the H. C. Frick Coke Co. has given orders for the starting of about 2,500 idle ovens before the end of the week. Prices are still weak, and foundry coke is quoted at $2@$2.25. Sales of furnace coke on contract have been made during the past few days at $1.60@$1.75, but some sales of standard Connellsville coke are reported to have been made as low as $1.50 a ton for early delivery. The *Courier* in its last report gives the production in the region for the previous week at 95,000 tons compared to 75,278 tons, a gain for the week of nearly 20,000 tons. The shipments aggregated 4,406 cars distributed as follows: To Pittsburg, 1,443 cars; to points west of Pittsburg, 1,875 cars.

San Francisco. Jan. 6.

(*From Our Special Correspondent.*)

The following circular is issued by Mr. J. W. Harrison, of San Francisco, under date of December 31, covering the year 1903:

"The quantity of coal imported during the year is 230,044 tons less than 1902, as shown by the figures below; this cannot be accepted as the amount of fuel to fill our requirements, as the quantity of fuel oil which has been produced this year has been 60 % in excess of the products of 1902, hence the showing made for the coal consumption cannot be accepted as being a discouraging one for manufacturing interests locally. The early portion of this year, labor disturbances developed themselves in the British Columbia collieries; these were not amicably compromised for some considerable time, as the manager of the Wellington collieries showed a disposition to maintain his rights rather than make concessions, although at a serious loss to himself; the laborers finally acceded to his demands. The abrogation of the duty of 67c. per ton on Australian and British Columbia coals, has proved for the year a marked advantage for these products, and has aided in giving large consumers here a pronounced benefit. The duty expires January 15; it will be a marked detriment to our manufacturers, and large consumers of fuel, if the duty on coal does not remain eliminated; if it resolves itself into a case where the greater good to the greater number is considered, the duty on coal will never again be considered.

"The present position is a complicated one; the outlook for low-priced Australian coal is discouraging, partially because the inducements for carriers to come here are anything but profitable, and partially because outward freights on grain from here are exceedingly low, and grain freights from Australia are fully 50% higher than from here. The quantity of coal of all grades on hand here at present is small. There are uncertain factors now existing which may create a very generous demand for fuel in the near future; principally the requirements of our Government for Panama, and adjacent ports, hence the market is in a very uncertain condition. If the present outward rates of freight on grain from here should show no improvement in the near future, it will minimize colonial imports, thus leaving the control of the local coal market in very few hands, which will assure high figures for 1904. The marked difference between the prices of domestic grades and ordinary steam coals is likely to be sustained, as the output of the former is concentrated in very few hands.

"The various sources from which we have derived our coal supplies are as follows:

	1902.	1903.	Changes.
British Columbia	591,732	289,890	D. 301,842
Australia	197,328	276,186	I. 78,858
English and Welsh.....	95,621	61,580	D. 34,041
Scotch	3,600	3,495	D. 105
Eastern (Cumberland and anthracite)	24,133	13,262	D. 10,871
Seattle (Washington) ..	165,237	127,819	D. 37,418
Tacoma (Washington)..	209,358	256,826	I. 47,468
Mount Diablo, Coos Bay and Tesla	111,209	84,277	D. 26,932
Japan and Rocky mountains by rail.....	47,380	102,219	I. 54,839
Total	1,445,598	1,215,554	D. 230,044

"To secure a complete statement of the entire coal consumption of California, I have been obliged to include deliveries at Port Los Angeles and San Diego by water, which have been added in the above sources of supply. The total amount received by water at those ports foot up 69,248 tons.

"*Fuel Oil.*—It can be safely computed that the Californian production of oil for 1903 will foot up between 20,000,000 and 21,000,000 bbl., as against 13,000,000 bbl. for 1902. Deducting the quantity which will be refined, and the amount which will be exported, there will yet remain enough for steam uses to be a disturbing factor in the consumption of coal. During the year there has been a further improvement in price of oil. The railroad companies have absorbed most of the more promising properties, the output of which will not seek buyers, hence the market price will not be affected. It is anticipated that the product of oil the coming year will largely exceed the figures for 1903; this may prove true, but there is evidence already before us that the output of a large number of our older wells is shrinking materially, and in some cases very markedly.

"*Coke.*—The total deliveries here by water foot up 68,090 tons, as against 64,916 tons last year. Fully 75% of this amount was shipped from England and Germany, the balance principally from Belgium and Australia.

"*Pig Iron.*—The total importations by water aggregate 29,845 tons, about half of this being shipped from Great Britain. This would demonstrate an increase of manufacturing interests during the year, as the total amount received in 1891 was 8,478 tons.

"The general review for the year for the consumption of fuel and pig iron will clearly indicate that the year has proved a profitable one in the manufacturing line, and we have reason to believe that there will be no diminution the coming year; in fact, we have promises before us for a marked increase over the present year."

Foreign Coal Trade. Jan. 13.

There is little new here at present, either in export or import business. The only item to be noted is the shipment of a very large cargo of Pocahontas coal from Lambert's Point to a port in Japan or China, presumably for naval purposes.

Messrs. Hull, Blyth & Co., of London and Cardiff, report under date of January 2 that there is no change in the Welsh coal market, and prices are unaltered, as follows: Best Welsh steam coal, $3.60@$3.66; seconds, $3.54; thirds, $3.36; dry coals, $3.48; best Monmouthshire, $3.24; seconds, $3.18; best small steam coal, $2.04; seconds, $1.92; other sorts, $1.68.

The above prices for Cardiff coal are all f. o. b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f. o. b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½% discount.

The freight market is quiet and unchanged. Some rates quoted from Cardiff are: Marseilles, $1.40; Genoa, $1.38; Naples, $1.38; Las Palmas, $1.38; St. Vincent, $1.50; Rio Janeiro, $2.04; Santos, $2.34; Buenos Aires, $1.68.

IRON TRADE REVIEW.

New York, Jan. 13.

The first quarter of the year does not show any material change in the iron market, and buyers are still evidently adhering to the waiting policy to a considerable extent. There has been some movement in pig-iron, chiefly on immediate delivery and first-quarter orders. Blast furnaces, both in the north and in the south, are a little reluctant to take contracts far ahead at the present low range of prices. At the same time there is a better undercurrent of feeling, and in the Pittsburg district several furnaces, which went out last year for repairs, or for other causes, are now preparing to start up again.

In finished material business continues rather dull. There is a little more animation in structural material, but buyers still demand reductions which makers seem to be very reluctant to grant. It looks very much though as if the structural-makers would recede from their position, and make concessions similar to those already granted in other lines. The position in plates is very much the same.

In several lines independent producers are beginning to make themselves felt in the trade, and unless the large interests see their way to concessions, it is quite probable that this influence will be still more evident in the future. The question of wages seems to be gradually settling itself; at least we hear of no serious disturbances, although there are, of course, protests against reductions and some threats of strikes.

The United States Steel Corporation has announced the renewal of its participation plan for another year. Employees are to be allowed to buy preferred stock in very much the same way as they did a year ago. With this difference they can take stock now at $55 instead of $82, the price fixed last year.

Birmingham. Jan. 11.

(*From Our Special Correspondent.*)

The conditions of the pig iron market in the southern territory have not improved since the opening of the new year, so far as demand is concerned. However, there is a better price obtained for iron. A couple of small lots, less than 1,000 tons, have been sold this year, delivery within six or eight weeks, at the rate of $10.50 per ton for No. 2 foundry. The temporary agreement made by several of the southern iron producers before Christmas was for No. 2 foundry iron to be sold at $10 per ton. The Sloss-Sheffield Steel & Iron Co. state that it sold during November 84,000 tons of iron and delivered 42,000 tons, and in December 100,000 tons of iron were sold and 53,000 tons delivered. This company is producing about 34,000 tons of iron a month, so that the shipments in November and December reduced the surplus stock 27,000 tons. The shipments this month so far have been satisfactory.

The monthly inspection of iron sales-books by the committees of the miners to ascertain the average selling price in order to fix the coal mining wage for the month showed that the average of the iron sold by the Sloss-Sheffield Steel & Iron Co. was but a few cents under $9 per ton for No. 3 foundry, while with the Tennessee Coal, Iron & Railroad Co., there was a difference much larger. The $9 rate would have brought about an increase in the mining wage for the miners. The Tennessee Co. sold during last month a good sized order of iron to the United States Cast Iron Pipe Co., but the rate was very low, this having much effect toward holding down the average.

The Republic Iron & Steel Co. has blown out its No. 3 furnace at Thomas, near here. This is a new furnace, being blown in about a year and a half ago. New lining is needed. Only one of the three furnaces of this company is now in operation at Thomas.

The following are the quotations of iron in the southern territory: No. 1 foundry, $10@$10.50; No. 2 foundry, $10; No. 3 foundry, $9.50; gray forge, $8.75@$9; No. 1 soft, $10@$10.50; No. 2 soft, $10.

The American Casting Co. has erected a plant at East Birmingham, and has started operation. This plant is small, but has good prospects. George H. Harris is president of the company. A new steel casting plant is to be erected in this district in the near future, Virginia parties being behind the movement.

The rumor of absorption of Alabama plants by large northern interests, as far as iron and steel industries go, is bitterly denied.

Chicago. Jan. 11.

(*From Our Special Correspondent.*)

There is still a reluctance on the part of buyers of pig iron to contract for more than two or three months ahead of their immediate requirements. Northern iron is being bought more freely than for many months past, as a result of the higher price of southern, which is being held firmly to a minimum figure of $10, Birmingham, or $13.85, Chicago. The minimum price of northern is only 15c. higher, or $14. It appears to be the opinion of local agents that southern cannot hold up long in the local market at this slight difference, unless the demand

should greatly increase, which is not at all probable. The market, generally speaking, is still one of waiting on the part of both the seller and the buyer. Large contracts are not being made and quick deliveries continue to be actively sought, a premium of $1 being obtainable on spot lots.

Coke is weak, the supply being plentiful and the demand not extraordinary. The price of Connellsville is $4.90@$5, and this low figure will doubtless continue the quotation for the next week, unless shipments are restricted.

Cleveland. Jan. 12.

(From Our Special Correspondent.)

Iron Ore—The slight consumption of ore in the Valleys is indicated by the light movement from the lakes to the furnace stock-piles. However, a consideration bearing upon this situation is the heavy movement which has already taken place between the lakes and the furnaces. At best, the movement away from the lake docks is reduced to the minimum, and, it is said, that the consumption at the furnaces is also very light. Nothing is being done about fixing the ore prices for the ensuing year.

New York. **Jan. 13.**

Pig Iron.—Some improvement is reported in inquiries, but buying is still light. We quote as follows, for northern irons, good brands: No. 1X foundry, $15.25@$16; No. 2X, $14.50@$15.25; No. 2 plain can be had for 50c. less; while gray forge is selling around $13.75. For southern irons on dock quotations are: No. 1 foundry, $14.50; No. 2 foundry, $14, with lower grades in proportion. No. 1 soft can be had at about $14.50 and No. 2 soft at $13.75.

Bar Iron and Steel.—The demand shows little improvement. Refined bars are quoted at 1.45@1.50c. in large lots, with steel at about the same. Common iron bars are 1.35c.

Plates.—Sales are still confined almost wholly to small lots for immediate needs. Sheared plates are quoted as follows: Tank, ¼-in. and heavier, 1.76@1.80c.; flange, 1.95@2.05c.; marine, 2.10@2.15c.

Steel Rails.—The quotations remain $28 for standard sections, f. o. b. mills; light rails, $33@$36, according to weight.

Structural Material.—The market is expected to improve now that consumers are beginning to feel that the outlook is better than it seemed a few weeks ago. Large lots at tidewater are quoted at 1.75@2c. for beams, angles and channels.

Pittsburg. Jan. 12.

(From Our Special Correspondent.)

The expected improvement in the iron and steel trade after the opening of the new year is shown by the resumption at many of the idle blast furnaces in the central west. In the Pittsburg district 11 idle furnaces will be again in blast before the end of the week. All belong to the Carnegie Steel Co. and include 7 at Braddock, 2 at Rankin and 2 at Duquesne. Last week Chairman J. G. Butler, Jr., of the Bessemer Furnace Association, made a statement that 65% of the capacity of the furnaces was idle. This includes 155 furnaces tributary to the Lake Superior ore regions. These furnaces have an average capacity of 37,000 tons daily. Of these stacks 53 were in blast last week and 103 were idle. A number in the Mahoning and Shenango valleys have been started since that time and the indications are that fully three-fourths will be running before February 1. Several of the Braddock furnaces have been practically re-built since they were put out of blast. The improvements on Furnace H cost about $200,000. Sales of pig iron have not been large, and prices are still at a low point, but the number of inquiries is very heavy, and contracts for extended future delivery cannot readily be made at prices quoted for early shipment. The situation here has strengthened somewhat by the withdrawal of the large Southern furnace interests from the market, some having sold iron for a month or two ahead. Foundry No. 2 is firm at $10, Birmingham, or $14.35, Pittsburg. This is a higher rate than Northern foundry has sold during the past two weeks.

The re-adjustment of wages at the mills in the Pittsburg district was made, according to plans, on January 1, and in some instances the cuts were not as heavy as had been anticipated by the men. In several cases, however, there was great dissatisfaction, and at one or two of the mills in the big Homestead steel works trouble was threatened. The tonnage men in the 48-in. mill declared they would go on a strike last Thursday unless the new scale was modified. A few changes were made and the mill is still at work, although the men are not entirely satisfied. At a meeting of the principal officers of the United States Steel Corporation and the presidents of the subsidiary companies held in Pittsburg on Saturday some alterations in the new schedules of wages were authorized, and there is not likely to be any further trouble. Arrangements were also completed for the removal of offices of underlying companies to this city. The American Tin Plate Co. and the American Sheet Steel Co., now the American Sheet & Tin Plate Co., are moving here this week.

There is quite an improvement in the steel market, not particularly as to sales, but in the number of inquiries, which are expected to result in some large orders being placed before the first of the month. A number of small orders for structural shapes, plates, bars and sheets have been booked within the past week, and the indications are that the structural trade will be unsually brisk. A number of independent sheet mills are being started, after a long idleness, being able to compete for trade, owing to the concessions made by the Amalgamated Association of Iron, Steel & Tin Workers. Under the modified scale which became effective on January 1, the tonnage men accept a reduction of 10% in wages, and the limit of production is increased from 135 to 150 pairs per turn. This does not put the union mills on an equal footing with the non-union plants, but puts them in better shape to go after business. Evidence that bar iron prices have been extremely low for some time past was brought out yesterday at the bi-monthly examination of the sales sheets of the Republic Iron & Steel Co. and the American Steel Hoop Co., the latter now controlled by the Carnegie Steel Co. The sheets were examined at Youngstown, and showed that the average sales for the months of November and December were 1.30c. The previous examination showed an average of 1.50c. This means a reduction in the puddling rate under the sliding scale of the Amalgamated Association of 50c. a ton, to $5.25. The pay of the finishers is reduced 4%. This is the lowest rate for nearly two years. Another drop of 25c. will put the puddling rate at the base of the scale. Some sales of bar iron were made during the week as low as 1.25c. These low prices are due to the cut in steel bars from 1.60c. to 1.30c. made by the steel bar pool last November. Low prices are expected to rule for a month or two, when it is believed the demand will be much stronger.

Pig Iron.—There is but little buying of bessemer pig iron for future delivery. Several thousand tons were sold during the week for early shipment at very low prices. One sale of 1,000 tons is reported at $13.25, Valley furnace, and another of 1,500 tons at $13.20, Valley. A few smaller lots were sold at prices ranging from $13.50 to $13.75, Valley. Foundry iron is a trifle weaker, and while some furnaces are adhering strictly to the quotation of $14, Pittsburg, for No. 2, others are said to be shading that price by about 15c. About 1,000 tons of gray forge were sold at $13, Pittsburg.

Steel.—The market is quiet, but the members of the association are not quoting bessemer or open-hearth billets at less than the agreed price of $23. Outside interests are said to be quoting at $1 a ton less. Steel bars remain firm at 1.30c., and plates at 1.60c.

Sheets.—A number of independents have got into the market and are now quoting as low prices as the leading interest. There is not enough business for all and competition has brought the price of No. 28 gauge black sheets down to 2.30c. Galvanized sheets are selling at 3.35c.

Ferro-manganese.—There is but little change in the market, and domestic 80% is still quoted at $46 per ton.

CHEMICALS AND MINERALS.

(See also prices-current on page 106.)

NEW YORK, Jan. 13.

As had been expected, the annual inventory of many consumers shows depleted stocks, hence the frequency of orders on the market. Some annoyance is experienced by the delay in transportation, as a result of the recent storms, but this will soon be settled.

Talk of war between Russia and Japan has hinted at a sympathetic advance in the prices of the American powder trust, which is understood to control about 95% of this country's business. It should be remembered, however, that both Russia and Japan have large ammunition factories of their own, and that only a prolonged war would make it necessary to buy from other countries. Admitting this, it is interesting to mention that the United States exported in the 11 months ending November 30, 1903, a total of only 709,743 lb. gunpowder, and $1,968,586 worth of other explosives. The gunpowder trade is somewhat less than 1902, but other explosives show an increase and is the largest reported in years.

Asbestos dealers have been doing a lucrative business since the disastrous fire in Chicago, and the orders received for fireproof theatre curtains and like material will keep manufacturers busy for some time to come. The United States is the largest manufacturer of asbestos goods in the world, and imports annually nearly two-thirds of the Canadian mineral output.

Cyanide.—In Great Britain prices are lower, apparently owing to the keen competition with German manufacturers. It is understood that the British article has sold in New York around 19c. per lb. Other brands are quoted up to 20c., though sales have probably been made at less. Still there is a good profit to the seller on this side.

Bleaching Powder.—Aside from a few more 1904 contracts at $1.25 per 100 lb. at seaboard for British and American prime brands, and $1.20 for Continental, business is quiet. Second-hands have made odd sales at $1.10@$1.125 from dock.

Copper Sulphate.—An unusual exportation has been made from San Francisco, Cal., of 1,028 lb. blue vitriol to the Fanning Islands. Another event is the advance in the New York price to $4.90@$4.95 per 100 pounds.

Acids.—The higher cost of raw material has strengthened the price of acids. Deliveries are moderate, mostly on regular contracts.

We quote as below, per 100 lb., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°	$1.50	Oxalic, com'l	$5.00@$5.50
Muriatic, 20°	1.60	Sulphuric, 50°, bulk, ton	13.50@20.00
Muriatic, 22°	1.75	Sulphuric, 60°	15.0
Nitric, 36°	4.37½	bulk, ton	18.00@24.50
Nitric, 38°	4.75	Sulphuric, 66°	11.00
Nitric, 40°	5.00	bulk, ton	21.00@23 00
Nitric, 42°	5.37½		

Brimstone.—The receipt of several cargoes since our last report has satisfied immediate wants, and eased spot prices. Forward shipments, quoted at $22@$22.25 per ton for best unmixed seconds, are firm, owing to the higher ocean freight from Sicily. Best thirds are nominally 50c. less than seconds.

Pyrites.—Trade is lethargic, prices unchanged, and prospects for active spring consumption good.

We quote domestic pyrites $5 per ton for lump ore, f. o. b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44%. Spanish pyrites, carrying from 46@52% sulphur, are quoted at 11@12c. per unit for lump, and 10@10½c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—The approach of the fertilizer season, coupled with slightly higher ocean freight rates and the firm views entertained by producers in Chile, has given the market renewed strength. Spot sales are being made on the basis of $2.15@$2.20 per 100 lb.; arrivals, $2.15, and June-December, $2.05.

Messrs. Mortimer & Wisner's statement of

nitrate of soda, dated New York, Jan. 1, gives the following interesting statistics, in tons:

	1903.	1902.	1901.
Imported into Atlantic ports from West Coast S. A. from Jan. 1 to date	229,889	177,071	183,052
Stock in store and afloat Dec. 31, 1903, in New York	2,600	2,755	2,736
Boston	....	213	133
Philadelphia	3,100	....	1,330
Baltimore	2,000	1,253	3,325
Norfolk, Va.	....	861	2,261
Charleston	350	....	133
Savannah	50	1,393	399
Wilmington, N. C.	....	1,320	....
To arrive, due April 15, 1904	96,850	72,905	47,733
Visible supply to April 15, 1904	104,950	80,700	58,050
Stock on hand Jan. 1, 1903	7,800	10,000	1,793
Deliveries past month	17,224	11,749	22,188
Total yearly deliveries	229,589	179,613	175,176
Prices current Dec. 31	2.17½c.	1.97½c.	1.95c.

The deliveries in 1903 show an increase of 49,976 tons, or about 28%, as compared with 1902, and are the largest on record.

Sulphate of Ammonia.—Speculatively speaking, the market is firmer, primarily because the foreign situation has improved. Gas liquor, 24@25% for forward shipment, is quoted at $3.225@$3.25 per 100 lb. Evidently sellers' views are also influenced by the strength in the nitrate of soda market. Exports from Great Britain in the 11 months ending November 30, 1903, were 146,231 long tons, which is 2,550 tons less than 1902.

Phosphates.—To open a year with small stocks at the mines, and enough orders in the hands of producers to keep them busy shipping until operations at the mines can be resumed, are features which give encouragement. To offset this hope for continued prosperity in the industry, reports come from abroad that sales of American phosphates have recently been made at a slight discount. This, however, is because some exporters have been fortunate in chartering vessel room at a low rate. A change in the c. i. f. price, slight as it may have been on these odd transactions, has not reacted on the f. o. b. quotation, which has continued unchanged for some time past. Again, it seems opportune for foreign consumers to consider the policy of making short term contracts with miners, and thus share in any advantageous fluctuations in ocean freight rates, which sometimes will offset any advance in the f. o. b. price. Another beneficial effect would be the elimination of speculation in future deliveries.

According to Messrs. Auchincloss brothers, the shipments of Florida high-grade phosphate rock in the 11 months ending November 30 were, as below, in long tons:

To ports:	1902.	1903.	Changes.
Baltic	96,011	97,669	I. 1,658
Continental	290,158	275,379	D. 14,779
Mediterranean	26,008	23,252	D. 2,756
United Kingdom	46,773	31,393	D. 15,380
Domestic	....	1,000	I. 1,000
Total	458,950	428,693	D. 30,257

The decrease in 1903 is equivalent to about 7%, principally in the shipments to Germany and Sweden. The exports to Germany direct were 163,068 tons, while 68,029 tons were invoiced to Holland for transshipment to Germany.

Concerning the foreign phosphates, it is reported that the Christmas and Ocean island output in 1904, something like 125,000 tons, is already sold for export. Algeria exported through Bone in the 11 months ending November 30, 1903, a total of 261,113 metric tons. Tunis is forging ahead, having increased its output from 65,209 tons in 1899 to 320,000 tons in 1903, and in 1904 will ship about 400,000 tons, making a total of 1,417,996 tons in five years. Even in the Dutch West Indies, where the Aruba Phosphate Co. has a concession, production has grown, and in the fiscal year ending September 30, 1903, 24 cargoes were shipped to Europe, paying an export duty of 4,115.43 florins ($1,654.40). In addition to these shipments five other vessels were scheduled to sail from Aruba by the end of 1903.

Current ocean freight rates are about as follows:

Destination.	Shipping ports. Florida.	So. Carolina.	Algeria.
Baltic	$3.82@$3.84	.....	.....
Continental	3.00@ 3.36	$3.00@$3.12	$2.04
Mediterranean	3.60@ 3.72	.....	.....
U. Kingdom	3.00@ 3.12	2.64@ 3.00	1.92@ 2.16

Prices for phosphates, per ton, are as follows:

Phosphates.	F. o. b.	C. i. f. Gt. Britain or Europe.
*Fla. hard rock, 77@80%	$7.25@$7.50	$11.12@$12.09
land pebble, 68@73%	3.75@ 4.00	7.70@ 8.05
†Tenn., 78@82%	4.00@ 4.25	10.80@ 11.40
78%	3.75@ 4.00	.....
75%	3.25@ 3.50	.....
73@74%	2.95@ 3.20	.....
‡So. Car. land rock	3.25	.....
river rock	2.75@ 3.00	5.75@ 6.88
Algerian 63@70%	.....	.....
58@63%	.....	6.00@ 6.60
53@58%	.....	4.95@ 5.09
Tunis (Gafsa)	.....	6.15@ 6.60
Christmas Isle, 80@85%	.....	12.38@ 13.61
Ocean Isle, 82@88%	.....	13.39@ 14.45
Somme, Fr., 70@75%	.....	10.15@ 10.33
Bordeaux, Fr., 60@65%	.....	7.50@ 7.66
55@60%	.....	6.33@ 6.47
Liege, Bel., 60@65%	.....	6.88@ 7.03

*F. o. b. Florida or Georgia ports. †F. o. b. Mt. Pleasant. ‡On vessel, Ashley River, S. C.

METAL MARKET.

New York, Jan. 13.

Gold and Silver Exports and Imports,

All United States Ports in November and Year.

Metal	November. 1902.	November. 1903.	Year. 1902.	Year. 1903.
Gold: Exports	$720,331	$963,150	$33,177,479	$42,982,178
Imports	5,981,743	11,330,343	42,006,681	48,027,051
Excess	I. $5,261,412	I. $10,367,193	I. $8,829,202	I. $5,144,873
Silver: Exports	3,762,974	6,067,762	43,726,079	34,119,689
Imports	2,199,069	2,556,426	23,701,649	21,895,853
Excess	E. $1,563,905	E. $3,511,336	E. $20,024,430	E. $12,223,836

These exports and imports cover the totals from all United States ports. The figures are furnished by the Bureau of Statistics of the Department of Commerce and Labor.

Gold and Silver Exports and Imports, New York.

For the week ending January 9 and for years from January 1.

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.
Week	$84,591	$625,709	$814,450	$25,208
1904	84,591	625,709	814,4 0	25,208
1903	17,900	534,654	458,190	39,634
1902	769,300	10,547	1,004,812	22,656

Business continues fair, and in some directions is showing prospects of improvement, though the speculative markets remain dull. No special gold imports are noted, but foreign exchange continues at rather a low level.

The statement of the New York banks—including the 56 banks represented in the Clearing House—for the week ending January 9 gives the following totals, comparisons being made with the corresponding week of 1903:

QUOTATIONS ON STERLING EXCHANGE.

	1903.	1904.
Loans and deposits	$871,642,100	$915,992,200
Deposits	873,609,600	905,713,300
Circulation	45,639,100	44,697,600
Specie	156,549,000	166,401,900
Legal tenders	76,663,700	74,713,400
Total reserve	$233,212,700	$241,115,300
Legal requirements	218,402,400	226,428,325
Balance surplus	$14,810,300	$14,686,975

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison is made with the holdings at the corresponding date last year:

	1903. Gold.	1903. Silver.	1904. Gold.	1904. Silver.
N. Y. Ass'd	$156,549,000	.....	$166,401,900	.....
England	153,536,320	.....	149,980,465	.....
France	502,500,480	$219,087,400	469,447,840	$220,321,440
Germany	145,430,000	51,100,000	146,780,000	51,570,000
Spain	71,925,000	98,475,000	72,780,000	95,420,000
Netherlands	23,493,000	32,991,000	21,036,000	32,804,500
Belgium	14,983,335	7,491,665	15,613,335	7,806,665
Italy	84,345,000	10,411,000	108,520,000	17,371,500
Russia	382,865,000	34,065,000	431,375,000	35,690,000
Austria	230,700,000	62,045,000	231,165,000	61,005,000

The returns of the Associated Banks of New York are of date of January 9, and the others January 7, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

The silver market continues firm, owing to the absorption of large amounts on account of Indian Government purchases. The demand from the interior in India has been heavy, owing to the good crops and high prices prevailing for several commodities.

The United States Assay Officer in New York reports receipts of 31,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to December 31 are reported by Messrs. Pixley & Abell's circular as follows:

	1902.	1903.	Changes.
India	£6,367,450	£7,423,330	I. £1,055,880
China	203,800	310,060	I. 106,260
Straits	1,102,170	821,879	D. 280,291
Total	£7,673,420	£8,555,269	I. £881,849

Receipts for the week, this year, were £155,000 in bar silver from New York, £10,000 from Cape Town, and £13,000 from Australia; also £222,000 in Mexican dollars from the Straits, and £9,000 from Mexico; total, £409,000. Shipments were £232,000 in bar silver, and £60,500 in Mexican dollars to Bombay, and £25,000 in bar silver to Singapore; total, £317,500.

Indian exchange was firm in the closing week of the year, and the Council bills offered in London sold at an average of 16.125d. per rupee. Business in India is active, and exports large, so that the demand for bills is very good. There has also been more buying of silver for Indian account. It is reported from London that an additional £1,000,000 in gold has been engaged for shipment from Australia to India.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars	$0.45	$0.46¾
Peruvian soles and Chinese pesos	.42	.44
Victoria sovereigns	4.85⅛	4.87
Twenty francs	3.85	3.87
Spanish 25 pesetas	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

January	Silver N. Y. Cts.	Silver London, Pence.	Copper Lake, Cts. per lb.	Copper Electrolytic, Cts. per lb.	Copper London, £ per ton.	Tin, Cts. per lb.	Lead, Cts. per lb.	Spelter N. Y., Cts. per lb.	Spelter St. Louis, Cts. per lb.
7	57¾	26 11/16	12⅜@12⅝	12¼@12⅜	58	29⅛	4.20@4.25	4.87½	4.70
8	57⅝	26 11/16	12⅜@12⅝	12¼@12⅜	58¼	29⅛	4.20@4.25	4.87½	4.70
9	58¼	26 15/16	12⅛@12¾	12⅜@12¼	....	29¼	4.20@4.25	4.87½	4.70
11	58⅜	27 1/16	12⅛@12¾	12⅜@12¼	59	29⅜	4.20@4.25	4.87½	4.70
12	58⅜	27 1/16	12⅛@12¾	12⅜@12¼	58¼	29¼	4.20@4.25	4.87½	4.70
13	58⅝	27⅛	12⅜@12⅞	12¼@12⅜	58½	29¼	4.20@4 25	4.87½	4.70

London quotations are per long ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wire-bars: the price of electrolytic cathodes is usually 0.25c. lower than these figures

QUOTATIONS ON STERLING EXCHANGE.

January 7	4.84⅛	January 11	4.84¾
" 8	4.85	" 12	4.85
" 9	4.84¾	" 13	4.85¼

In our issue of January 7, in the table of daily prices of metals, the prices for Lake and electrolytic copper were transposed, owing to a proof-reader's mistake. Most of our readers, we think, detected the error, but we make this statement in order that all may understand it. The correct prices for electrolytic copper were: December 31, 12@12⅛; January 2, 12@12⅛; January 4, 12⅛@12⅜; January 5 and 6, 12¼@12½. The prices for Lake copper were: December 31, 12⅞@12¼; January 2, 12⅛@12¼; January 4, 12¼@12½; January 5 and 6, 12⅜@12⅝c. per pound.

Copper.—The market remains very firm, indeed, and a good business has been done at advancing prices. Exports during the month of January are expected to be larger than ever. The closing quotations are given as 12⅝@12⅞ for Lake; 12½@12⅝ for electrolytic in ingots, cakes and wirebars; 12¼@12⅜ in cathodes; 12⅛@12⅜ for casting copper.

The market for standard copper in London, which closed last week at £58 5s., opened on Monday at £59, declined on Tuesday to £58 5s., and the closing quotations on Wednesday are cabled at £58 2s. 6d.@£58 5s. for spot, £57 12s. 6d.@£57 15s. for three months.

In case there should be a war between Russia and Japan, it is feared that shipments of copper from the latter country will be interrupted. The annual production of copper in Japan amounts to 20,000 to 25,000 tons.

Refined and manufactured sorts we quote: English tough, £61. 5s.@£61 15s.; best selected, £62 5s.@£62 15s.; strong sheets, £72@£72 5s.; India sheets, £69@£69 5s.; yellow metal, 6⅜@6½d.

Exports of copper from New York, Baltimore and Philadelphia, from January 1 to 12, inclusive, were: Great Britain, 1,430 tons; France, 3,457; Germany, 1,870; Holland, 2,423; Italy, 204; Austria, 380; Russia, 150; total, 9,914 tons. Imports were 674 tons copper from Mexico, and 120 tons from Germany; total, 794 tons.

Tin has again ruled very firm throughout the week, but nothing of special interest has transpired. The closing quotations are given as 29½c. for spot and futures.

The foreign market, which closed last week at £132 7s. 6d., opened on Monday at £133 5s., declined on Tuesday to £133, but the closing quotations on Wednesday are cabled as £133 10s. to £133 12s. 6d. for both spot and futures.

All accounts received from the Straits Settlements seem to confirm the recent reports of a somewhat lessened production. The situation depends very much on what the Chinese speculators will do, who some time ago bought rather heavily.

Lead.—Has ruled very firm, indeed, throughout the week, and the closing quotations are given as 4.17½@4.20 St. Louis, 4.20@4.25 New York.

The foreign market has also displayed considerable strength, Spanish lead having advanced to £11 15s; English lead to £11 17s. 6d.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of December 25, that the price of silver during the week has been 13.50 reales per oz. Exchange has gone down, making it 34.09 pesetas to £1. The local quotation for pig lead on wharf has been 62.50 reales per quintal, which, on above exchange, is equal to £10 5s. 3d. per ton of 2,240 lb., f. o. b. Cartagena. Exports for the week were 600,000 kg. desilverized lead to London, 461,978 kg. pig lead and 939 kg. silver ingots to Marseilles.

Spelter remains quiet but steady. The smelters complain of the high prices asked for ore. The ruling quotations are given as 4.70c. St. Louis, 4.87½c. New York.

The foreign market is firm, good ordinaries being quoted at £21 15s.; specials at £22.

Spanish Zinc Ore Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of December 25, that very little has been doing in this market. It is probable that zinc ore has been produced at a profit in this district during 1903, although prices have fluctuated a great deal. Shipments for the week were 3,989 tons blende to Antwerp.

Antimony is somewhat firmer in tone, but business is still rather restricted. We quote Cookson's at 6¾@7; Hallett's, 6@6¼; U. S., Japanese, French Hungarian, Italian and Chinese at 5⅝@5¾c. These prices are for retail lots; for larger quantities they can no doubt be shaded.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Demand continues steady, and the price remains at $19 per oz.

Messrs. Eimer & Amend, of New York, quote prices for platinum in manufactured forms, as follows: Heavy sheet and rod, 72c. per gram; foil and wire, 75c. per gram; platinum crucibles and dishes, 77c. per gram; perforated wire, like cones, Geoch crucibles, etc., 82c. per gram.

Quicksilver.—The New York price is $45.50 per flask for large lots, while a slightly higher figure is quoted for smaller orders. The San Francisco quotations continue at $44@$45 per flask for domestic orders and about $41.50 for export. The London price is £8 5s. per flask, with the same quotation asked by second hands.

Cadmium.—According to Herr Paul Speier metallic cadmium was in good demand throughout 1903. Metal containing 99.5% cadmium sold at from 675 to 700 marks per 100 kg., delivered in Berlin.

Minor Metals and Alloys.—Wholesale prices, f. o. b. works, are as follows:

Aluminum	Per lb		Per lb
No. 1. 99% ingots	33@37c.	Ferro-Tungsten (37%)	38c.
No. 2. 90% ingots	31@34c.	Magnesium, pure (N. Y.)	60c.
Rolled Sheets	4c. up	Manganese	$2.75
Alum-bronze	20@23c.	Mangan'e Cop. (20% Mn)	32c.
Nickel-alum	33@39c.	Mangan'e Cop. (30% Mn)	38c.
Bismuth	$2.10	Molybdenum (Best)	$1.82
Chromium, pure (N. Y.)	80c.	Phosphorus, foreign	45c.
Copper, red oxide	50c.	Phosphorus, American	70c.
Ferro-Molybde'm (50%)	$1.25	Sodium metal	50c.
Ferro-Titanium (10%)	90c.	Tungsten (Best)	62c.
Ferro-Titanium (20@25%) N. Y.	55c.		

Variations in price depend chiefly on size of order.

Missouri Zinc Ore Market. Jan. 9.

(From Our Special Correspondent.)

The highest price reported paid for zinc ore was $38 per ton, and the assay basis ranges, according to quality of the ore, from $30 to $34 per ton of 60% zinc. It looked early in the week as though the same spirited competition that ran the price up $3 last week would result in a further advance, but it remained unchanged in general, though the inclination was to even up at this rate on some lots that sold at a less rate last week. This price is $3 per ton higher than the closing week of 1903, and $4.50 per ton higher than the same week of last year. Later in the week the purchasing agents for some of the smelters gave out the impression that prices were too high, and that a lower market might be expected next week. As the reserve stock is comparatively low, producers have little fear of any material slump, though it is conceded that ore may recede $1 per ton on some of the lots that were advanced out of proportion to market conditions, merely because certain smelters wanted to get control of certain grades of ore.

The price of lead continues firm, and ore is in steady demand at $54 per ton.

Following are the shipments from the several camps of the Joplin district for the week:

	Zinc Ore, lb.	Lead Ore, lb.	Value.
Joplin	2,436,290	399,060	$53,410
Webb City-Carterville	1,775,210	452,850	39,930
Galena-Empire	739,990	187,500	16,630
Carthage	533,340	.....	13,070
Alba-Neck	529,980	.....	10,800
Aurora	564,940	10,080	8,730
Duenweg	436,960	168,510	8,665
Badger	390,100	.....	6,630
Granby	353,000	23,000	4,365
Oronogo	209,830	12,390	3,575
Prosperity	154,930	26,070	3,250
Carl Junction	131,330	.....	2,360
Spurgeon	60,410	62,180	2,370
Zincite	109,260	2,010	1,910
Cave Springs	102,070	8,580	1,825
Central City	53,540	10,710	1,065
McDowell	63,000	.....	945
Diamond	50,900	.....	765
Totals	8,695,080	1,362,930	$180,295
Two weeks	19,319,720	2,615,660	$381,805

Zinc value: The week, $146,720; two weeks, $314,590.
Lead value: The week, $33,575; two weeks, $67,215.

Compared with the previous week, the shipment was 965 tons of zinc less and 55 tons of lead more. Compared with a year ago, the shipment was 76 tons of zinc and 239 tons of lead more, and with the higher zinc and lead prices this year the value was $29,353 greater. For the two weeks of the year the shipment has exceeded the same period of last year by 1,704 tons of zinc and 402 tons of lead, the value being larger by $102,900.

Average Prices of Metals per lb., New York.

Mo.	Tin.		Lead.		Spelter.	
	1903	1904.	1903.	1904.	1903.	1904.
Jan...	28.33	.....	4.075	.....	4.865	.....
Feb ..	29.43	.....	4.075	.....	5.043	.....
Mar..	30.15	.....	4.442	.....	5.349	.....
April.	29.81	.....	4.567	.....	5.550	.....
May .	29.51	.....	4.325	.....	5.639	.....
June .	28.34	.....	4.210	.....	5.697	.....
July..	27.68	.....	4.075	.....	5.662	.....
Aug..	28.29	.....	4.075	.....	5.725	.....
Sept..	26.77	.....	4.243	.....	5.686	.....
Oct...	25.92	.....	4.375	.....	5.510	.....
Nov..	25.42	.....	4.218	.....	5.338	.....
Dec...	27.41	.....	4.162	.....	4.731	.....
Year	28.09	.....	4.237	.....	5.400	.....

NOTE.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.681c.; for March, 5.174c.; for April, 5.375c.; for May, 5.469c.; for June, 5.537c.; for July, 5.507c; August, 5.55c, September 5.514c.; for October, 5.35c; for November, 4.886c; for December, 4.556c; for the year, 5.191 cents.

Average Prices of Copper.

Mo.	New York.				London.	
	Electrolytic.		Lake.		Standard.	
	1903.	1904.	1903.	1904.	1903.	1904.
Jan...	12.159	.....	12.361	.....	53.52	.....
Feb...	12.778	.....	12.901	.....	57.34	.....
Mar..	14.416	.....	14.572	.....	63 85	.....
April.	14.454	.....	14.642	.....	61.72	.....
May ..	14.435	.....	14.618	.....	61.73	.....
June .	13.942	.....	14.212	.....	57.30	.....
July..	13.094	.....	13.341	.....	56.64	.....
Aug..	12.962	.....	13.159	.....	58.44	.....
Sept..	13.205	.....	13.345	.....	56.82	.....
Oct...	12.801	.....	12.954	.....	55 60	.....
Nov..	12.617	.....	12.813	.....	56.30	.....
Dec. .	11.952	.....	12,084	.....	56.36	.....
Year	13.235	.....	13.417	.....	57.97	.....

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars: prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Mo.	1902.		1903.		1904.	
	London. Pence.	N. Y., Cents.	London Pence.	N. Y., Cents.	London. Pence.	N. Y., Cents.
Jan..	25.62	55.56	21.98	45.57	.....	.....
Feb..	25.41	55.09	22.11	47.89	.....	.....
Mar..	25.00	54.23	22.49	48.72	.....	.....
April.	24.34	52.72	23.38	50.56	.....	.....
May..	23.71	51.31	24.89	54.11	.....	.....
June .	24.17	52.36	24.29	52.86	.....	.....
July..	24.38	52.88	24.86	53.92	.....	.....
Aug..	24.23	52.52	25.63	55.36	.....	.....
Sept..	23.88	51.52	26.75	58.00	.....	.....
Oct...	23.40	50.57	27.89	60.36	.....	.....
Nov..	22.70	49.07	27.01	58.11	.....	.....
Dec...	22.21	48.03	25.73	55.375	.....	.....
Year	24.09	52.16	24.75	53.45	.....	.....

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

ASSESSMENTS.

Company—	Delinquent.	Sale.	Amount.
Baltic, Cal.	Jan. 21	.....	$0.01
Best & Belcher, Nev.	Jan. 15	Feb. 5	.10
Con. Col. & Va., Nev.	Jan. 15	Feb. 5	.25
Con. St. Gothard, Cal.	Jan. 16	.....	.07
Exchequer, Nev.	Jan. 4	.....	.03
Hale & Norcross, Nev.	Jan. 4	Jan. 30	.10
Petro, Utah.	Feb. 5	Feb. 27	.01¼
San Houston, Cal.	Feb. 15	.....	.02
Union Con., Nev.	Jan. 11	Feb. 1	.10
Utah Con., Nev.	Feb. 2	.....	.10
Yellow Jacket, Nev.	Jan. 16	Feb. 20	.10

DIVIDENDS.

Company.	Latest Dividend. Payable.	Rate.	Total.	Total to date.
*Bunker Hill & Sull.	Jan. 5	$0.10	$30,000	$1,550,000
†Bon Air I., pf.	Jan. 2	1.50	28,205	28,205
†Continental Z.	Jan. 1	.40	8,800	61,600
*Daly West, Utah.	Jan. 15	.65	117,000	3,714,000
†N. S. Ste. & Coal, pf.	Jan. 15	2.00	20,600	226,600
Osceola Copper.	Jan. 29	1.00	96,150	4,343,450
†Portland, Colo.	Jan. 15	.06	180,000	4,837,080
†Rob Roy Zinc.	Jan. 1	.02	277	2,530
*Silver King, Utah.	Jan. 10	.66⅔	100,000	7,450,000
Tamarack Copper.	Jan. 21	1.50	90,000	8,580,000
Tenn. Coal, pf.	Feb. 1	2.00	4,960	312,064
Tenn. Copper.	Jan. 29	1.25	218,750	437,500
†U. S. Steel Corp., pf.	Feb. 15	1.75	3,614,417	96,491,663

• Monthly. † Quarterly. ‡ Semi-annually.

STOCK QUOTATIONS

NEW YORK.

Company.	Par val.	Jan. 6 H.	Jan. 6 L.	Jan. 7 H.	Jan. 7 L.	Jan. 8 H.	Jan. 8 L.	Jan. 9 H.	Jan. 9 L.	Jan. 11 H.	Jan. 11 L.	Jan. 12 H.	Jan. 12 L.	Sales.
Alpha	1									20	18			330
Amalgamated, c.	100	50⅞	48¼	49⅞	48¼	50¼	47⅞	51¼	50¼	51⅜	49⅜	50¼	49⅛	392,200
Anaconda, c.	25			72½		75		76						400
Andes, s.	7									50				200
Belcher, s.	3							55	50	70		70		700
Best & Belcher, s.	25							3.50	3.20					2.0
Brunswick, g	5	05				05						05½		6,000
Bullion, s.	1							15		20	19	24	23	1,000
Caledonia, s.	1			98		1.05		1.25		1.50				500
Challar, s., g.	2½	33		31	30	37				38				1,600
Confidence	3									1.10				100
Con. Cal. & Va., g. s.	2½	1.80	1.75	1.75		1.50				3.20		3.00		700
Con. Imperial	1	05				06				07	06			2,500
Cripple Creek, g.	1													
Crown Point	2½					30				40				300
Daly, g. s. l.	20	1.80												200
Elkton, g.	1			45		47				45		45		900
El Paso, g.	1											60		500
Gould & Curry	1					65	63	75						1,000
Greene Con., c.	10	13	11½	12⅛	11⅜	12¼	12¼	13⅛	12⅜	13½	12⅛	13¾	13¼	28,780
Hale & Norcross	3	87				87	85			1.00		1.00		600
Homestake, g.	100													
Horn Silver	20	1.20												100
Isabella, g.	1							12				12		1,100
Jack Pot	1													
Julia, s.	1					07		09				14		1,700
Justice, s.	2	16		13	12					14		22	20	1,100
Little Chief, g. s.	50									07				500
Mexican s.	3	2.00		2.00								4.00		300
Mollie Gibson, g.	5													
Moon Anchor, g.	5									10				1,000
Moulton, g	25									24				25
Occidental, s.	3			55										200
Old Gold	1													
Ontario, s.	100													
Ophir, s.	3	4.25						5.75				7.50		350
Overman, s.	2													
Pharmacist, g.	1													
Phœnix, g.	1									10	09			600
Portland, g.	1	1.25				1.45	1.45							700
Potosi, s.	1			25				38	36			46	45	1,300
Savage, s.	3			56	55	63		83	75					900
Sierra Nevada, s.	3	73	72					1.20	1.15					900
Silver Hill, g. s.	1							70						100
Small Hopes, g. s.	20			30										600
Standard, g.	10													
Syndicate, g.	1													
Tenn., c.	25	31⅛	31⅛	32	31⅛	32	31⅛	32	31½	31⅞	31⅝			3,210
Union Con., g. s.	1	88		86				1.40	1.35			1 80	1.75	1,000
Union Copper	25			½						⅝		⅝		1,100
United, com., c.	100	5	5⅞			⅝						6¼		2,064
White Knob, c.	10	8⅜	8			6				9	8	9	8⅝	1,040
Yellow Jacket, s.	3			44				53	52					800

c—Copper. g—Gold. l—Lead. s—Silver. Total sales, 480,194 shares. † Ex-dividend.

COLORADO SPRINGS (By Telegraph).

Company.	Jan. 11. H.	Jan. 11. L.	* Jan. 12. H.	* Jan. 12. L.
Acacia	.08	.06		
Am. Con.				
Anaconda	.11½	.10½		
Colo. City & M.				
Cripple Ck Con.	.03½	.03		
C. K. & N.	.11½	.12		
Doctor-Jack Pot.	.05	.04½		
Elkton Con	.50	.48		
El Paso	.58½	.57½		
Gold Dollar Con.	.03¾	.03½		
Golden Cycle	.60	.55½		
Gold Soverign	.04	.03¼		
Golden Fleece				
Isabella	.10½	.10		

Company.	Jan. 11. H.	Jan. 11. L.	* Jan. 12. H.	* Jan. 12. L.
Jack Pot	.05¼	.02		
Keystone	.03⅛	.02⅞		
Last Dollar	.50	.50		
Lexington	.04½	.04½		
Little Puck	.01⅜	.01		
Mollie Gibson	.05¼	.05		
Moon Anchor	.09¾	.09		
New Haven	.02¾	.01½		
Old Gold	.09	.08⅜		
Pharmacist	.03⅛	.02⅝		
Pinnacle				
Portland	1.47	1.30		
Vindicator	.75	.65		
Work	.05⅜	.05		

* No quotations reported.

COLORADO SPRINGS, COLO.*

†Company.	Par Val	Jan. 2 H.	Jan. 2 L.	Jan. 4 H.	Jan. 4 L.	Jan. 5 H.	Jan. 5 L.	Jan. 6 H.	Jan. 6 L.	Jan. 7 H.	Jan. 7 L.	Jan. 8 H.	Jan. 8 L.	Sales
Acacia	$1	.04		.07	.06	.08	.06	.07	.06½	.08	.07	.08	.09½	5,000
American Con.	1	.02		.02		.02		.02		.02		.02		
Anaconda	5	.11¼	.11	.11⅜	.11	.11⅜	.10⅜	.11⅜		.11⅜	.10½	.11⅜	.10½	1,000
Colo. City & M.	1	.009		.009		.009		.009		.009		.009		1,000
C. K. & N.	1	.17	.14¼	.15¼	.14½	.15½	.14½	.17		.15	.14	.14½	.13	10,000
Cripple Ck. Con.	1	.03¼		.04	.03	.04	.03	.03		.03¼	.01¼	.03½	.03	
Des Moines	1	.02	.01¼	.02	.01½	.02	.01½	.01¾	.01¼	.01¾	.01¼	.02	.01¼	
Doctor Jack Pot.	1	.05	.03	.04¾	.04¼	.04½		.04¼		.05	.04¼	.05	.04	14,500
Elkton Con.	1	.50	.48	.50	.49½	.50	.47	.49½	.45	.49½	.47½	.49½	.47½	4,750
El Paso	1	.59½	.56	.61	.56¾	.57		.58¾	.57	.59	.58¼	.58¾		5,700
Findley	1													
Gold Dollar Con.	1	.03⅝	.03½	.03⅝		.03¾	.03⅝	.03¾	.03½	.03¾	.03	.03¾	.03¼	7,000
Gold Sovereign	1	.05	.03	.03		.03		.04	.03	.03		.03¾	.03	
Golden Cycle	1	.60	.54	.58	.54	.60	.56½	.60	.56¼	.60	.57	.60	.57	500
Golden Fleece	1	.03		.06		.06		.06		.06		.05		
Hart	1	.01½		.01½		.01½		.01½		.01½		.01½		
Isabella	1	.10	.08½	.10⅝	.09	.10⅛	.10	.10½	.01	.10½	.10	.10½	.10	2,000
Jack Pot	1	.05¼	.02	.05¼		.05		.05¼		.05¼		.05		
Keystone	1	.02¾	.02¼	.02¾	.02⅝	.02¾	.02¼			.03	.02¾	.03	.02¾	16,000
Last Dollar	1	.51		.50		.50		.50		.50		.50		
Lexington	1	.04¼	.04	.05¼	.04½	.05	.04⅛	.04½	.04	.04½	.03¾	.04½	.03½	1,000
Little Puck	1	.02		.02	.01	.02	.01	.02		.02		.02		
Mollie Gibson	5	.05		.05		.05		.05		.05		.05		
Moon-Anchor	5	.09¼		.10½	.09½	.10½	.09½	.11	.09½	.10	.09	.10	.09	4,600
New Haven	1	.02¼		.02¼	.01	.02½	.01½	.02½		.02½	.01½	.02½	.01½	
Old Gold	1	.09½	.08¾	.09½	.08¾	.09	.08¾	.09	.08¾	.09	.08¾	.09	.08¾	8,000
Pharmacist	1	.02½	.02¼	.02½		.03¼	.02½	.03½	.02½	.03½	.02½	.03	.02¾	
Pinnacle	1	.03		.03		.03		.03		.03		.03		
Portland	1	1.40	1.25	1.50	1.28	1.50	1.25	1.60	1.37	1.50	1.39	1.45	1.35	1,000
Vindicator Con.	1	.75		.75		.75		.75		.75		.75		
Work	1	.04¾	.04½	.05	.04½	.05	.04½	.04⅝	.04⅝	.04¾	.04⅝	.04⅝		1,000

*Colo. Springs Mining Stock Exchange. †All gold mines in Colorado.
Total sales, 83,050 shares.

SAN FRANCISCO (By Telegraph).

Company.	January 11.	January 12.
Belcher	.60	.43
Best & Belcher		2.95
Caledonia	1.40	1.25
Challenge Con.	.40	.31
Chollar	.40	.33
Confidence	1.25	1.15
Con. California & Virginia	2.90	2.34
Con. Imperial	.04	.04
Crown Point	.41	.33
Gould & Curry	.80	.61
Hale & Noroross	.96	.90

Name of Company.	January 11.	January 12.
Justice	.18	.17
Mexican	3.65	2.90
Occidental Con.	.90	.70
Ophir	7.50	6.50
Overman	.45	.33
Potosi	.40	.30
Savage	.83	.61
Sierra Nevada	1.35	1 00
Union Con.	1.65	1.30
Utah Con.	.38	.23
Yellow Jacket	.48	.47

COAL, IRON AND INDUSTRIAL STOCKS.

Company.	Par val.	Jan. 6 H.	Jan. 6 L.	Jan. 7 H.	Jan. 7 L.	Jan. 8 H.	Jan. 8 L.	Jan. 9 H.	Jan. 9 L.	Jan. 11 H.	Jan. 11 L.	Jan. 12 H.	Jan. 12 L.	Sales
Allis-Chalmers	$100													
Preferred	100					60	55			55				713
Am. Agr. Chem	100													
Preferr d	100													
Am. Sm. & Ref.	100	48	47¾	47⅝		48⅜	48	48½	48⅜	48⅛	48	47⅛		2,545
Preferred	100	89¾	88¾	89¼		89½				89¼		90¾	90	1,667
Am. Steel Fdy	100			5										100
Preferred	100													
Col. Fuel & I.	100	29	28	30⅛	27⅝	29¾		31	29	30	29⅝	29⅛	28¼	1,250
Preferred	100			50										122
Col. & H. C. & I.	100	14¾		15	14¼	15⅛	15			15⅛	14¾	15		1,520
Crucible Steel.	100									4½	4	4	3⅞	610
Preferred	100	30⅞	30	29¾	29⅞	28⅞				28⅛		28	28¾	1,253
General Chemical	100			55										216
Preferred	50													
Mong. R. Coal.	50													
Preferred	100			26										10
National Lead.	100			15	14½	15	14½			15¾	14¾			3,000
Preferred	100	80¼		79¾										200
Phila. Nat. Gas	100			40	39½	40	39¾					39¾		135
Preferred	100													
Pittsburg Coal	100					15¼				14¾	14⅜	14	10	2,257
Preferred	100	58½	58	58½	58	59	58⅜	58¾	58	58	58⅛	57	47	5,345
Republic I. & S.	100	7	6⅜	6⅞	6¾	7				7	7	6¾		1,550
Preferred	100	42	41	40¾		41½		41⅞		41⅞	41¼	41½	41	1,350
Sloss-Shef S. & I.	100	32	31¼	31½		34						31½		385
Preferred	100			79										100
Standard Oil	100	660	650	652½	649½	650	649	650				652		104
Tenn. C.I. & R.R.	100	36¼	35	36	35¼	36	35⅝	38½	36⅜	37	36¾	36¼	36	7,060
U.S. Red. & Ref.	100													
Preferred	100													
‡U.S.Steel Corp.	100	10½	9⅝	10¼	9¾	10¼	10	10¾	10⅛	10⅝	10⅜	10⅝	10¼	124,466
Preferred	100	55½	54⅜	56¼	55⅛	56⅜	55⅞	57⅛	56½	57½	56⅞	56⅝	56⅛	234,320
Va.-Car Chem.	100	30¼	28½	29	28½	30	29	29⅜	29	29¼	29	28¾	28½	7,657
Preferred	100			98		100				100				300
Va. I. & Coke	100													

†Ex-dividend Total sales, 398,235.

BOSTON, MASS.

Company.	Par val	Jan. 6 H.	Jan. 6 L.	Jan. 7 H.	Jan. 7 L.	Jan. 8 H.	Jan. 8 L.	Jan. 9 H.	Jan. 9 L.	Jan. 11 H.	Jan. 11 L.	Jan. 12 H.	Jan. 12 L.	Sales.
Adventure Con., c	$25	3		2⅝		2⅞	2⅝	3		3	3½	2¼		290
Allouez, c.	25			4¾		4¾		4¾	4¾	4¾	4¾			565
Amalgamated, c.	100	50⅞	48⅜	49⅛	48⅜	50¼	48	51⅛	50⅜	51⅜	49¾	50¾	49¼	47,261
Am. Gold Dredg.	5													
Am. Z., L. & Sm.	25			10										5
Anaconda, c. s.	25											19⅞		20
Arcadian, c.	25			.90		.80								130
Arnold, c.	25													
Atlantic, c.	25	8⅛	7¾											52
Bingham Con.	50	23¼	22¾	23	22½	23	22¾	23		22¾		22¾	22½	1,005
Bonanza Dev. g.	10													
British Col., c.	5													
Calumet & Hecla	25	440		437						442	437	442		38
Centennial, c	25	16¼	15½	15⅝	15½	16	15⅝	16⅛		17¼	16⅛	16¾	16⅛	2,781
Central Oil.	25	7		7						7⅛	7			140
Con. Mercur, g.	5	.70		.75	.65	.65		.65		.65		.65	.63	2,200
Copper Range	100	46¾	45	45½	45	46	45	48½	45⅝	46½	46	45¼	45½	5,715
Daly West, g. s. l	20	36		36	35⅜	36		35¼	35	35		35	34⅜	815
†Dominion Coal.	100	71		71	69¼	69¾	69½					69	68¼	430
Preferred	100											112¾		4
Dominion I. & S.	100	9¾	9½	9		6½	9	9⅛		9		9		345
Elm River, c.	12			2¼		2¼						2¼		270
Franklin, c.	25	9¼	9					9¼	9	9¼	9	9	8⅞	745
Granby Con.	10	3 1/16		3 1/16		3 1/16				3¾		3⅞	3¾	1,102
Guanajuato Con.	5					.75						.76		110
Isle Royal Con.	25	7⅞	7					7¾	7	8	7¾	7⅞		1,360
Mass Con., c.	25	4						4⅝	4¼	4½		4¼		675
Mayflower, c.	25													
Michigan, c.	25							1 6/16		6½				240
Mohawk, c.	25	38¾	37⅞			38	37¾			38½	38¼	38		560
Mont. Coal & C.	25					3	2⅞							110
Mont'l & Boston.	5													
New Idria, q.	5													
Nova Scotia St.	100													
Preferred	100													
Old Colony, c.	25									1¼				600
Old Dominion, c.	25	10¾				11	10	11		10½		10		480
Osceola, c.	25	62	60	61		60		60½		61½	61	60		873
Parrot, s. c.	10			22				22⅜	22	22⅜				98
Phœnix Con, c.	25							3						50
Quincy, c.	25			95				95		1.00	95			90
Rhode Island, c.	25													
Santa Fe, g. c.	10	2	1⅜	1⅜				2		2				1,630
Shannon, c.	10	8	7¼	7½	7⅜	7⅞	7¾	8	7 1/16	8		8¼	7¾	3,394
Tamarack, c.	25	100						111	110	110		107		231
Tecumseh, c.	25													
Tennessee, c.	25													
Trinity, c.	25	5½	4⅞	5	4¾	5	4⅞	5		5		5		1,100
Union Ld. & Cop.	25													
United c.	100													
United States, g.	10	19	18¼	18½	18⅜	18	18½	19	18⅝	19½	19	19¼	19	4,703
U. S. Coal & Oil.	25	9⅛	8¾	8¾		8⅞		9		8¾	8¾	8⅛		1,457
Utah Con., g. c.	5	33⅝	31⅝	32½	31¾	33	31¾	33	32¾	33⅜	33	33	32⅝	13,731
Victoria, c.	25	2⅝	2¼	2¼				2⅛	2¼	2⅛	2¼	2⅜	2¼	974
Winona, c.	25							7¼	7	7⅛		7		160
Wolverine, c.	25	70	69¾	69¼		69¾		70		70½	70	70½	70	490
Wyandot, c.	25	1⅛				1⅛				1⅛		1⅛		320

†Ex-dividend. ‡Assessment Paid. Total sales, 97,839 shares.
c—Copper g—Gold. l—Lead. q—Quicksilver. s—Silver.

SAN FRANCISCO.*

Company.	Location.	Jan. 1* H.	Jan. 1* L.	Jan. 2* H.	Jan. 2* L.	Jan. 4 H.	Jan. 4 L.	Jan. 5 H.	Jan. 5 L.	Jan. 6 H.	Jan. 6 L.	Jan. 7 H.	Jan. 7 L.	Sales
Cent. Eureka g.	Cal													
Esperanza g.	Nev.							.01						2,500
GoldenAn.Mg.Co	Nev.									.25		.27		1,100
MacNamara, g.	Nev.													
Mon.-Tonopah, g	Nev.					1.25	1.17½	1.25	1.15			1.25	1.20	7,979
N.Y. Tonopah, g.	Nev.													
Paymaster	Nev.										.10			100
Ray&O'B'nM.Co.	Nev.									.10				200
Rescue, g.	Nev.					.07		.07				.07		3,450
South Eureka	Cal													
Tonopah-Bel't,g.	Nev.									.71	.68			800
Ton. Mid. Mg.Co.	Cal					.75				.46	.44	.46	.42	1,400
Tonopah, g.	Nev.									.33	.31	.30		1,900

San Francisco and Tonopah Mining Exchange.
*Holiday. †Ex-Dividend g—Gold. Total sales, 19,429 shares

STOCK QUOTATIONS

MEXICO.* Dec. 31

Company.	Shares Issued.	Prices. Bid.	Prices. Ask.
Durango:			
Ca. Min. de Penoles	2,500	$3,800	$4,100
San Andres de la Sierra	200	10,000	.....
Guanajuato:			
Angustias, Pozos	2,400	50	55
Cinco Senores y An., aviadoras	2,000	70	80
Cinco Senores y An., aviada	400	75	80
Providencia, San Juan de la Luz	6,000	56	62
Queensland y Australia	300	68	75
Guerrero:			
Delfina, 1st serie	2,500	35	40
Delfina, 2nd serie	2,500	30	40
Garduno y Anexas	7,200	40	50
Hidalgo:			
Amistad y Condordia	9,600	86	87
Carmen, aviada	1,100	120	150
Guadalupe Fresnillo Mill	1,000	160	250
Guadalupe Fresnillo Mine	1,400	70	80
La Blanca, aviadora	1,538	.....	.....
La Blanca, aviada	768	.....	.....
La Reina y An., aviadora	5,600	16	18
Luz de Maravillas, aviadas	1,100	.....	20
Maravillas y An., aviador	1,680	120	140
Maravillas el Lobo	1,000	130	180
Palma y An., aviador	1,800	.....	12
Real del Monte	2,554	.....	.....
Refugio, aviada	12,800	5	7
Santa Anay An., aviadora	1,800	95	100
Santa Anay An., aviada	600	30	40
Sta. Gertrudis y An., aviadas	9,600	13	15
Sta. Gertrudis y An., aviadora	28,800	87	88
Santo Tomas Apostol aviadoras	5,100	2	3
San Felipe de Jesus, aviadora	3,600	17	19
San Felipe de Jesus, aviada	1,200	6	10
San Rafael y An., Trompillo	1,200	1,700	1,750
San Rafael y An., aviada	1,200	700	710
Soledad, aviada	960	700	710
Sorpresa, aviada	960	340	360
.....	.....	.....	.....

Name of Company.	Shares Issued.	Prices. Bid.	Prices. Ask.
Mexico:			
Alacran	2,400	30	40
Aldebarren	2,000	70	75
Buen Despacho	3,000	55	65
Dos Estrellas	3,000	1,800	2,150
La Esperanza (El Oro.)	3,000	1,500	1,500
La Reformia, aviadores	2,000	33	38
Providencia, pagadoras	1,600	.....	.....
Providencia, liberadas	900	.....	.....
Santa Ana, Esperanza	2,400	90	.....
Michoacan:			
Luz de Borda, aviadora	3,000	60	80
Luz de Borda, aviado	1,000	26	38
Santiago y An., Tlal.	4,000	6	11
Nuevo Leon:			
La Fraternal	1,000	580	620
Norias de Bajan	1,000	880	920
San Luis Potosi:			
Concepcion y An.	3,000	70	75
El Barreno, aviadora	2,000	36	42
Sta. Maria de la Paz	2,400	190	195
San Diegoy Annexas	2,400	8	10
Zacatecas:			
Asturiana y An.	2,500	60	65
Candelaria y Pinos	2,500	130	140
Cubiertas	2,400	.....	.....
Esperanza y An.	2,400	6	8
Lourdes	2,500	25	32
Luz de Minillas, pagadoras	2,000	15	30
Nueva Quebradilla, aviadoras	2,400	95	105
Nueva Quebradilla, aviadas	600	70	80
San Carlos y Annexas	2,500	120	125
Sta. Maria de Gaud	2,500	60	65
Miscellaneous:			
Bartolome de Medina	2,000	78	80
Guadalupe Hacienda	20,000	.....	.....
La Luz Hac. (Pachuca.)	3,750	.....	.....
La Reina (Chihuahua.)	192	.....	.....
Naica (Chihuahua.)	100	11,000	13,000
Natividad (Oaxaca) aviadora	1,800	1,000	1,050
Natividad (Oaxaca) aviadas	600	.....	.....
San Francisco Hac.	6,000	68	69
Santa Ana Huantla Morelos	4,000	.....	.....
Union Hacienda	3,000	215	230

*Values are in Mexican currency.

TORONTO, ONT. Jan. 9

Company.	Par val	Prices. High.	Prices. Low.	Sales
Black Tail, g	$1	.04	.02	.....
Cariboo-McKin	1	.06	.03	.....
Cariboo Hydr	1	.70	.....	.....
Center Star, g. s	1	.23½	.22	.....
Crows Nest, C.C	100	2.60	2.00	.....
Dominion Coal	100	.71½	.69	25
Dominion S. & I.	100	.10	.09	.....
Fairview, g. s	1	.04	.03	.....
Giant, g. s	1	.02½	.01	.....
Deer Trail, g. s	1	.02	.01	.....
Iron Mask, g. s	1	.06	.....	.....
Morrison, g. s	1	.04	.02	.....
.....	.....	.....	.....	.....

Company.	Par val	Prices. High.	Prices. Low.	Sales
Granby Smelter	$10	4.30	3.80	.....
Mountain Lion, g.	1	.18	.11	.....
North Star, g. s.	1	.08	.07	.....
Nova Scotia Steel	100	.....	.....	.....
Payne, s. l	1	.16	.12	.....
Rambler Carib	1	.30	.24	.....
Republic, g	1	.03	.02	.....
St. Eugene, g. s	1	.40	.30	.....
Virtue, g. s	1	.07	.06	.....
War Eagle Con	1	.12	.10	.....
Sullivan, g. s	1	.06	.03	.....
Winnipeg, g. s	1	.04	.....	.....
Wonderful, g. s	1	.63	.....	.....

g—Gold. l—Lead. s—Silver. Total sales, 25.

SALT LAKE CITY.* Jan. 9

Company	Par Val	High	Low	Sales.
Ajax	10	.05	.04½	600
Butler Liberal	1	.10⅝	.09¼	2,000
Carisa	1	.11½	.11¼	4,000
Ce tury	1	.91¼	.78½	1,800
Con. Mercur	1	.70	.60	5,850
Daly	5	2.75	2.60	810
Daly-Judge	1	4.00	3.45	1,850
Daly West	20	35.90	35.50	500
Dalton	.....	.02½	.01½	7,000
Grand Central	1	3.60	3.60	100
Ingot	½	.03	.01½	22,000
Joe Bowers	1	.....	.....	.....
La Reine	1	.02½	.02½	2,000
Little Be l	10	1.00	1.00	100
L. Mammoth	1	38.25	36.25	1,400
May Day	¼	.07⅝	.07¼	12,700

Name of Company	Par Val	High	Low	Sales.
M. Washington	½	.00⅝	.00½	4,000
Naildriver	2	.65	.60	1,200
N. Y. Bonanza.	1	.11½	.07¾	15,860
Northern Light	5	.....	.....	.....
Richm'd Anda	1	.....	.....	.....
Sacramento	5	.21	.18¼	4,000
Silver King	1	.....	.....	.....
Silver Shield	20	.04¼	.03¾	3,600
Star Con	1	.....	.....	.....
Tetro	1	.29⅛	.28⅝	13,000
Uncle Sam Con.	1	.24	.21¾	10,700
Utah	1	.....	.....	.....
Valeo	1	.....	.....	.....
Victor Con	1	.04	.04	500
Wabash	1	.03⅜	.03	700
Yankee Con	1	.40	.40	1,000

*By our Special Correspondent. All mines are in Utah. Total sales, 117,010 shares.

PHILADELPHIA, PA *

Name and Location of Co.	Par val.	Jan. 6 H.	Jan. 6 L.	Jan. 7 H.	Jan. 7 L.	Jan. 8 H.	Jan. 8 L.	Jan. 9 H.	Jan. 9 L.	Jan. 11 H.	Jan. 11 L.	Jan. 12 H.	Jan. 12 L.	Sales
Am. Cement	$10	.....	.....	7⅛	7¾	.....	.....	.....	.....	7⅛	7¼	.....	.....	350
Cambria I., Pa.	50	47¾	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	20
Cambria S., Pa	50	18¾	18⅜	18¾	18½	18⅞	18¾	19	18¾	19¼	19	19	.....	2,214
Pa. Steel, pfd	100	.....	.....	.....	.....	73½	73	.....	.....	.....	.....	.....	.....	109
Susq. I & S., Pa	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	⅝	.....	400
Un'd Gas Imp.	50	86⅛	85⅛	85⅞	85⅛	85⅞	85¼	86	85½	86⅛	85¼	86	.....	2,275
Lehigh Nav'n	50	.....	.....	.....	.....	.....	.....	64⅜	.....	64½	64⅜	64⅜	.....	38
Philadelphia	50	40¾	40	40¼	39⅞	40¼	40	40¼	40¼	40⅞	40⅛	40⅛	39¾	1,323
U.S. Steel	100	10⅝	9⅝	10⅛	9¾	10⅛	10	10⅝	10⅛	10¾	10½	10⅝	10⅛	11,079
U.S. Steel, pf.	100	55⅛	54¾	56⅛	55¾	56⅛	56	57	56⅝	57⅛	57⅛	.....	.....	10,386

†Ex-Dividend Total sales 28,867.

LONDON. Dec. 30

Company.	Shares Issued.	Par value.	Latest dividend. Amt.	Latest dividend. Date.	Quotations. Buyers.	Quotations. Sellers.
American:		£. s. d.	s. d.		£ s. d.	£ s. d.
Alaska-Treadwell, A. g.	200,000	5 0 0	1 6	Nov., 1903	4 10 0	4 15 0
Anaconda, Mont., c. s.	1,200,000	5 0 0	2 0	Nov., 1903	3 18 9	4 1 3
Camp Bird, Col., do, g.	820,000	1 0 0	9	Nov., 1903	1 5 0	1 7 6
Copiapo, Chile, c.	112,500	2 0 0	6 10	May, 1903	17 6	1 2 6
De Lamar, Idaho, g. s.	80,000	1 0 0	2 0	Oct., 1903	10 0	12 6
El Oro, Mexico, g. s.	1,080,000	1 0 0	9	Dec., 1903	1 5 0	1 7 6
Frontino & Bolivia, C. g. s.	128,662	1 0 0	3 0	July, 1901	7 6	10 0
Le Roi, British Col. g. s.	200,000	5 0 0	5 0	Nov., 1899	13 9	16 3
Le Roi No. 2, Brit'h C., g.	120,000	5 0 0	5 0	May, 1902	18 9	1 1 3
Montana, Montana, g. s.	657,128	1 0 0	6	April 1899	9	1 3
Standard, Arizona, c.	500,000	4 0	2½	Sept., 1903	3 6	4 6
Stratton's Ind., Col., g.	1,000,007	1 0 0	6	Dec., 1903	5 6	6 0
St. John del Rey, Braz., g.	546,265	1 0 0	6	Dec., 1903	14 0	15 0
Tomboy, Colorado, g.	300,000	1 0 0	1 0	June, 1902	1 12 6	1 17 6
Utah Consolidat'd, U.c.g	300,000	1 0 0	6 3	Jan., 1904	5 15 0	6 0 0
Ymir, British Col., g.	200,000	1 0 0	1 0	Mar., 1902	3 9	6 3
European:						
Linares, Spain, l.	15,000	3 0 0	1 0	Mar., 1903	2 10 0	3 0 9
Mason & Barry, Port., c.	185,172	1 0 0	11 0	May, 1903	3 7 6	3 12 6
Rio Tinto, Spain, c.	325,000	5 0 0	32 6	Nov., 1903	49 7 6	49 12 6
Rio Tinto, pref., Spain, c.	325,000	5 0 0	2 6	Nov., 1903	6 0 0	6 5 0
Tharsis, Spain, c.	625,000	2 0 0	6 0	May, 1903	4 12 6	4 17 6
West Australian:						
Associated, g.	495,388	1 0 0	2 0	Jan., 1904	2 16 3	2 18 9
Cosmopolitan Prop., g.	400,000	1 0 0	1 0	May, 1903	15 0	15 6
Golden Horse Shoe, g.	300,000	5 0 0	6 0	Nov., 1903	8 18 9	9 1 3
Great Boulder Prop. g.	1,750,000	2 0	9	Dec., 1903	1 8 0	1 8 6
Great Fingall Consol., g.	250,000	1 0 0	8 0	Jan., 1904	8 10 0	8 12 6
Ivanhoe g.	200,000	5 0 0	5 0	Oct., 1903	8 17 6	9 0 0
Kalgurli, g.	120,000	1 0 0	2 6	Jan., 1904	5 10 0	5 12 6
Lake View Consols, g.	250,000	1 0 0	rts.	Aug., 1902	1 10 0	1 12 6
Oroya-Brownhill, g.	450,000	1 0 0	2 6	Dec., 1903	3 17 6	4 0 0
Miscellaneous:						
Brilliant Cen. Queens., g	100,000	1 0 0	1 0	Jan., 1904	2 17 6	3 2 6
Briseis, Tasmania, t.	600,000	1 0 0	.....	.....	6 3	6 9
Broken Hill Pr. N.S.W. sl	960,000	8 0	1 0	Aug., 1903	1 10 0	1 11 0
Mt. Lyell, Tasmania, c.	275,000	3 0 0	4 3	Sept., 1903	1 6 0	1 1 0
Mt. Morgan, Queensl'd, g	1,000,000	1 0 0	3	Jan., 1904	2 2 6	2 7 6
Waihi, New Zealand, g.	497,412	1 0 0	2 6	Dec., 1903	5 0 0	5 2 6
Indian:						
Champion Reef, g.	513,832	10 0	6 6	Jan., 1904	8 0 0	8 2 6
Mysore, g.	566,043	10 0	4 4	Jan., 1904	6 12 6	6 15 0
Nundydroog, g.	484,000	10 0	1 6	Nov., 1903	2 2 6	2 5 0
Ooregum, g.	343,000	10 0	9	Dec., 1903	1 2 6	1 5 0
Ooregum, pref., g.	240,000	10 0	1 9	Dec., 1903	1 12 6	1 15 0
South African:						
Angelo, g.	600,000	1 0 0	4 0	Jan., 1904	6 16 3	6 18 9
Bonanza, g.	200,000	1 0 0	10 0	Jan., 1904	2 3 9	2 6 3
British South Africa	4,436,019	1 0 0	rts.	May, 1889	2 5 0	2 6 3
Cape Copper, c.	300,000	2 0 0	4 0	Jan., 1904	3 2 6	3 5 0
Cape Copper, pref., c.	75,000	2 0 0	1 9	Jan., 1904	3 0 0	3 5 0
City & Suburban, g.	340,000	4 0 0	8 0	Feb., 1903	6 15 0	7 0 0
Consol. Gold-Fields	2,000,000	1 0 0	.. ..	.....	6 10 0	6 15 0
Crown Reef, g	120,000	1 0 0	20 0	Oct., 1903	17 0 0	17 10 0
De Beers Con., d.	800,000	2 10 0	10 0	Jan., 1904	19 6 3	19 8 9
De Beers Con., def., d.	1,000,000	2 10 0	15 0	Jan., 1904	20 6 3	20 8 9
East Rand Proprietary, g	930,000	1 0 0	5 0	Aug., 1903	7 0 0	7 2 6
Ferreira, g.	90,000	1 0 0	22 6	Jan., 1904	19 10 0	20 0 0
Geldenhuis Estate, g.	200,000	1 0 0	6 0	Feb., 1904	6 2 6	6 7 6
Geduld, g.	400,000	1 0 0	rts.	Mar., 1902	6 7 6	6 10 0
Henry Nourse, g.	125,000	1 0 0	10 0	Feb., 1904	8 15 0	9 0 0
Jubilee, g.	50,000	1 0 0	5 0	Feb., 1904	4 17 6	5 2 6
Jumpers, g.	100,000	1 0 0	5 0	Aug., 1899	3 2 6	3 7 6
Langlaagte Estate, g.	470,000	1 0 0	2 0	Feb., 1904	3 13 9	3 16 3
May Consolidated, g.	288,750	1 0 0	3 6	Feb., 1904	4 1 3	4 3 9
Meyer & Charlton, g.	100,000	1 0 0	5 0	Jan., 1904	5 12 6	5 17 6
Modderfontein, g.	280,000	1 0 0	rts.	Apr., 1902	8 13 9	8 16 3
Namaqua, c.	94,331	2 0 0	3 0	Dec., 1903	3 2 6	3 7 6
New Jagersfontein, d.	200,000	5 0 0	10 0	Dec., 1903	28 7 6	28 12 6
New Primrose, g.	325,000	1 0 0	3 0	Jan., 1904	3 15 0	3 17 6
Rand Mines, g.	1,795,956	5 0	4 0	Aug., 1902	9 13 9	9 16 3
Robinson, g.	750,000	5 0 0	5 6	Dec., 1903	9 16 3	9 18 9
Robinson Deep, g.	950,000	1 0 0	3 0	Jan., 1904	5 10 0	5 12 6
Rose Deep, g.	425,000	1 0 0	2 6	Feb., 1904	8 2 6	8 7 6
Salisbury, g.	100,000	1 0 0	2 0	Mar., 1899	1 15 0	2 0 0
Sheba, g.	1,075,000	1 0 0	6	July, 1889	10 0	13 9
Villagein M Reef., g.	400,000	1 0 0	3 0	Jan., 1904	7 10 0	7 15 0
Wemmer, g.	80,000	1 0 0	10 0	July, 1903	11 0 0	11 10 0

c—Copper. d—Diamonds. g—Gold. l—Lead. s—Silver. t—Tin.

LONDON (By Cable.)*

Company.	Jan. 6 £. s. d.	Jan. 13 £. s. d.	Company.	Jan. 6 £. s. d.	Jan. 13 £. s. d.
Anaconda	3 15 0	3 17 6	Johannesburg In.	2 5 0	2 5 0
British So. Africa.	2 3 9	2 3 9	Modderfontein	8 11 3	8 11 3
Camp Bird	1 5 3	.....	Rand Mines	9 12 6	9 11 3
Con. Gold Fields.	9 6 3	9 6 3	Rio Tinto	49 0 0	50 0 10
De Beers Con. def.	20 2 6	20 0 0	Simmer & Jack	1 10 7½	1 11 3
East Rand	6 16 10	6 15 0	Tomboy	1 13 9	1 12 6
El Oro, Mex.	1 6 3	1 5 7½	.....	.....	.....

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. Dec. 23

Company.		Capital Stock.	Par value.	Latest divs.	Prices. Opening.	Prices. Closing.
		Francs.	Fr.	Fr.	Fr.	Fr.
Alameda	Cal.	1,000,000	1	9.50	4.00	5.00
Anzin, Coal	France	.....	.....	290.00	5,575.00	5,575.00
Boleo, c.	Lower Cal.	12,000,000	500	62.50	1,748.00	1,750.00
Champ d'Or, g.	S. Africa.	3,375,000	25	3.75	20.00	20.00
Courrieres, Coal		600,000	300	110.00	2,885.00	2,852.00
Fraser River, g.	Brit. Col.	250,000	25	.....	5.50	5.50
Huanchaca, s.	Bolivia.	40,000,000	125	5.00	77.25	76.00
Laurium, z. l.	Greece.	16,300,000	500	25.00	350.00	349.00
Malfidano, z.	Italy	12,500,000	500	50.00	564.00	564.00
Metaux, Cie. Fran. de.	France	25,000,000	500	22.50	495.00	493.00
Mokta-el-Hadid, i. l.	Algeria	18,312,000	500	40.00	835.00	845.00
Nickel, n.	N. Caled'nia.	15,000,000	250	22.50	516.00	509.00
Penarroya, Coal	Spain.	.....	500	45.00	1,147.00	1,135.00
Sedalia & California, c.	Cal.	1,000,000	1	.....	4.25	4.25
Vielle Montagne z.	Belgium.	9,000,000	30	30.00	672.00	676.00
Wyoming, s.	Cal.	.....	25	.....	323.00	324.00

c—Copper. g—Gold. i—Iron. l—Lead. n—Nickel. o—Oil. s—Silver. z—Zinc.

ST. LOUIS, MO.* Jan. 9

Name.	Par Val.	Prices. Bid.	Prices. Ask.	Name.	Par Val.	Prices. Bid.	Prices. Ask.
Am.-Nettie, Colo.	$10	$0.25	$0.50	Columbia Lead, Mo.	$10	$3.00	$3.50
Catherine Lead, Mo.	10	.90	2.00	Con. Coal, Ill.	100	20.00	21.00
Central Coal & C.	100	57.00	59.00	Doe Run Lead Mo.	100	110.00	115.00
Central C. & C., pf.	100	70.00	71.00	Granite Bimet. Mt.	10	.45	.50
Central Lead, Mo.	100	110.00	115.00	St. Joe Lead, Mo.	10	14.75	16.00

*By our Special Correspondent.

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

ABRASIVES—		
Carborundum, f.o.b. Niagara Falls, Powd.	lb.	$0.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Barry's Bay, Ont.	"	.07½@.09½
Mont. f.o.b. Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, in kegs: Turkish flour	"	.03½
Grains	"	.05@.05½
Naxos flour	"	.03½
Grains	"	.05@.05½
Chester flour	"	.03½
Grains	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour	"	.01½
Grains, in kegs	"	.02¼
Crude, ex-ship N. Y.: Abbott (Turkey)	lg. ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h.gr.	"	26.00
Garnet, per quality	sh. ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01½@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.05
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10¾@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.20
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N. J.	"	.06
ALCOHOL—Grain	gal	2.46@2.48
Refined wood, 95@97%.	"	.50@.55
Purified.	"	1.25@1.30
ALUM—Lump	100 lbs.	1.75
Ground	"	1.85
Porous	"	1.00
Powdered	"	3.00
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua, 16°	lb.	.03
18	"	.03¼
20	"	.03¾
26	"	.05½
AMMONIUM—		
Carbonate, lump	"	.07½
Powdered	"	.08¼
Muriate gram.	"	.05⅝
Lump	"	.09⅛
Nitrate, white pure (95%)	"	.12
Phosphate, com'l	"	.09
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05¾@.07¾
Oxide, com'l white, 95%	"	.09½
Com'l white, 95%	"	.12
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White	"	.03¼@.03¾
Red	"	.06⅜@.06½
ASPHALTUM—		
Ventura, Cal.	sh. ton	32.00
Cuban	lb.	.01½@.03½
Egyptian, crude	"	.05½@.06
Trinidad, refined	sh. ton	35.00
San Valentino (Italian)	lg. ton	16.00
Seyssel (French), mastic	sh. ton	21 00
Gilsonite, Utah, ordin'y	lb.	.03
Select	"	.03¾
BARIUM—		
Carb. Lump, 80@90%	sh. ton	$25.00@27.00
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100 lbs.	1.67½@1.76
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.05⅞
BARIUM—		
Sulphate (Blanc Fixe)	lb.	$0.02
BARYTES—		
Am. Crude, No. 1	sh. ton	9.75
Crude, No. 2	"	8.00
Crude, No. 3	"	7.00
Floated	"	18.50
Foreign gray	"	13.50
Snow white	"	17.25
Floated	"	18.75
BAUXITE—Ga. or Ala. Mines:		
First grade	lg. ton	5.50
Second grade	"	4.75
BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02¼@.02¼
BORAX	"	.07¼@.07½
BROMIDE—Bulk	"	.4⅛
CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50
CALCIUM—Acetate, gray	"	1.40
" brown	"	.90
Carbide, ton lots f.o.b. Niagara Falls, N. Y.. for Jersey City, N. J.	sh. ton	70.00
Carbonate, ppt	lb.	.05
Chloride	100 lbs.	.70@.90
CEMENT—		
Portland, Am., 400 lbs.	bbl.	1.50@1.75
Foreign	"	1.75@2.25
"Rosendale," 300 lbs.	"	.85
Slag cement,	"	1.25@1.50
CERESINE—		
Orange and Yellow	lb.	.13
White	"	.14
CHALK—Lump, bulk	sh. ton	3.00
Ppt. per quality	lb.	.04@.05¼
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50% ch.) ex-ship N. Y.	lg. ton	24.75
Bricks f.o.b. Pittsburg	M	175.00
CLAY, CHINE—Am. com., exdock, N. Y.	lg. ton	8.25
Am. best, ex-dock, N. Y	"	9.25
English, common	"	10.75
Best grade	"	16.75
Fire Clay, ordinary	sh. ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.50
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—Bulk	100 lbs.	.47½
In bbls	"	.52½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25-lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for nitro (32 -2-10° Be.)	"	.12½@.12⅝
FELDSPAR—Ground	sh. ton	@10.00
FLINT PEBBLES—Danish. Best	lg. ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Lump	sh. ton	8.00@10.00
Ground	"	11.50@13.50
FULLER'S EARTH—Lump	100 lbs.	$.80
Powdered	"	.85
GRAPHITE—Am. f.o.b. Providence, R.I., lump	sh. ton	8.00
Pulverized	"	30.00
Am. pulv., other than R. I., f. o. b., New York	"	45.00
Best flake	"	150.00
German, com. pulv	lb.	.01¼@.01½
Best pulverized	"	.01½@.02
Ceylon, common pulv	"	.02¾@.03½
Best pulverized	"	.04@.08
Italian, pulverized	"	.01¼
GYPSUM—Ground	sh. ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg. ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—Ground.		
American best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100lbs	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l.	"	.01¼
True	"	.04
Oxide, pure copperas color	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
KRYOLITH—(See Cryolite.)		
LEAD—Acetate, white	lb.	.08½ @ .8¾
Brown	"	.06½@.06¾
Nitrate, com'l	"	.06½
" gran	"	.08¼
LIME—Com., abt. 250 lbs	bbl.	.80
Finishing	"	1.02
MAGNESITE—Greece.		
Crude (95%)	lg. ton	5.00@5.50
Calcined	sh. ton	15.50
Bricks, best imp., f.o.b. N.Y.	M.	155.00
Bricks, domes., per qual., f.o.b. Pittsburg	"	160.00@200.00
MAGNESIUM—		
Carbonate, light, fine pd	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs.	.75@.95
MANGANESE—		
Crude powd. 70@75% binoxide	lb.	.01¼@.01½
75@85% binoxide	"	.01½@.02¼
85@90% binoxide	"	.02¼@.03¼
90@95% binoxide	"	.03¼@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore	unit	.18@.20
MARBLE—Flour	sh. ton	6.00@7.00
MERCURY—Bichloride	lb.	.77
MICA—N. Y. gr'nd, coarse	sh.ton	33.00@38.00
Fine	lb.	.00¾@.02
Sheets are sold as to size and quality		
MINERAL WOOL—		
Slag, ordinary	sh. ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL—Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr.		
25@30, cold test	gal.	.13¼@.13¾
15, cold test	"	.13¾@.14¼
Zero	"	.18@.19
Summer	"	.12¾@.13¼
Cylinder, dark steam ref	"	.14½@.15½
Dark, filtered	"	.18¼@.19½
Light, filtered	"	.21¼@.22¼
Extra cold test	"	.25½@.31½
Gasoline, 86 @90	"	.17@.22
Naphtha, crude, 68°@72°	bbl.	12.40
"Stove"	gal.	.15
Linseed, domestic raw	"	.35@.37
Boiled	"	.39
Calcutta, raw	"	.65
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.03
Pure	"	.16
Yellow, common	"	10¼
Best	"	.14
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd	"	.05@.05½
English flake	"	.08¼@.08½
Glassmakers'	"	.06½@.08¼
PAINTS AND COLORS—		
Metallic, brown	sh. ton	19.00
Red	"	16 00
Ocher, Am. common	"	8.50@9.00
Best	"	21.25@25.00
Dutch, washed	lb.	.06
French, washed	"	.01½@.01⅞
Orange mineral, Am.	"	.07½
Foreign, as to make	"	.06¾@.10½
Paris green, pure, bulk	"	.11
Red lead, American	lb	$.05¾@.06
Foreign	"	.06¼@.07¼
Turpentine, spirits	gal.	.59½@.60
White lead, Am., dry	lb.	.04¼@.04¾
American, in oil	"	.05¼@.06¼
Foreign, in oil	"	.07 @.09
Zinc, white, Am., ex. dry	"	.04⅝@.04¾
Foreign, red seal, dry	"	.06@.06¾
Green seal, dry	"	.06¼@.06¾
POTASH—		
Caustic, ordinary	"	.04½@.04⅞
Elect. (90%)	"	.06⅛
POTASSIUM—		
Bicarbonate cryst	"	.08¼
Powdered or gran	"	.14
Bichromate, Am	"	.08½@.08¼
Scotch	"	.08½@.09
Bromide	"	@.30
Carbonate (80@85%)	"	.03½@.04⅝
Chlorate, powd	"	.06¾@.07¼
Crystals	"	.06½@.07
Chromate	"	.35
Cyanide (98@99%)	"	.20
Kainit	lg. ton	9.30
Manure salt, 20%	100 lbs.	.66
D'le Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95	"	1.86
Permanganate	lb.	.09½@.09⅝
Prussiate, yellow	"	.14½@.14⅝
Red	"	.36 @.36¾
Sulphate, 90%	100 lbs.	2.11
96%	"	2.14
Sylvanit	unit	.41
QUARTZ—(See Silica.)		
SALT—N. Y. com. fine	280 lbs.	bbl..72@1.18
N. Y. agricultural	sh. ton	4.40
SALTPETER—Crude	100 lbs	3.40@3.62½
Refined	"	4.00@4 50
SILICA—		
Ground quartz, ord'ry	sh. ton	8.00@10.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.35½
Oxide	"	.85@1.10
SODIUM—		
Bicarb., ord., bulk f.o.b. wk's	100 lbs.	1.30
Extra domes., f. o. b. works	"	3.50
Bichromate	lb.	.06¾
Carbonated ash, high test, in bags, f.o.b. works	100 lbs.	.72½@.80
Foreign, f.ob. N. Y.	"	.90@.92½
Caustic, 70@76%, f.o.b. works	"	1.75@1.80
Caustic 60%	"	1.85@1.90
Foreign, f.o.b N. Y.	"	1.90@1.95
Chlorate, com'l	"	.06¾@.07
Hyposulphite, Am	"	1.60@1.65
German	"	1.70@1.90
Nitrate, spot and nearby	"	2.20@2.25
Shipments	"	2.05@2.10
Peroxide	lb.	.45
Phosphate	"	.02½@.02¾
Prussiate	"	.10⅛
Sal soda, f.o.b. works	100 lbs.	.60
Foreign, f.o.b. N. Y.	"	.67½
Silicate, conc	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lbs.	.82½
Sulphide, crystals, bbl.	lb.	.01¾
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lbs.	1.85
Flour	"	2.10
Flowers, sublimed	"	2.20
TALC—N. C., 1st grade	sh. ton	20.00
N. Y., Fibrous, best	"	10.28
French, best	100 lbs.	2.00
Italian, best	"	2.25
TAR—Regular	bbl.	2.70
Oil, bbl	"	4.50
TIN—Crystals, bbl	lb.	.21½
Oxide	"	.35
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.09⅝
Carbonate, ppt	"	.09
Chloride solution, com'l	"	.02¼
Chloride granular	"	.15
Dust	"	.04¾@.04⅞
Sulphate	"	.02½@.02¾

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	35.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	30.00
LITHIUM—Carbonate	"	1.35
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07⅞@.08⅛
THORIUM—Nitrate 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
ZIRCONIUM—Nitrate	lb.	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.